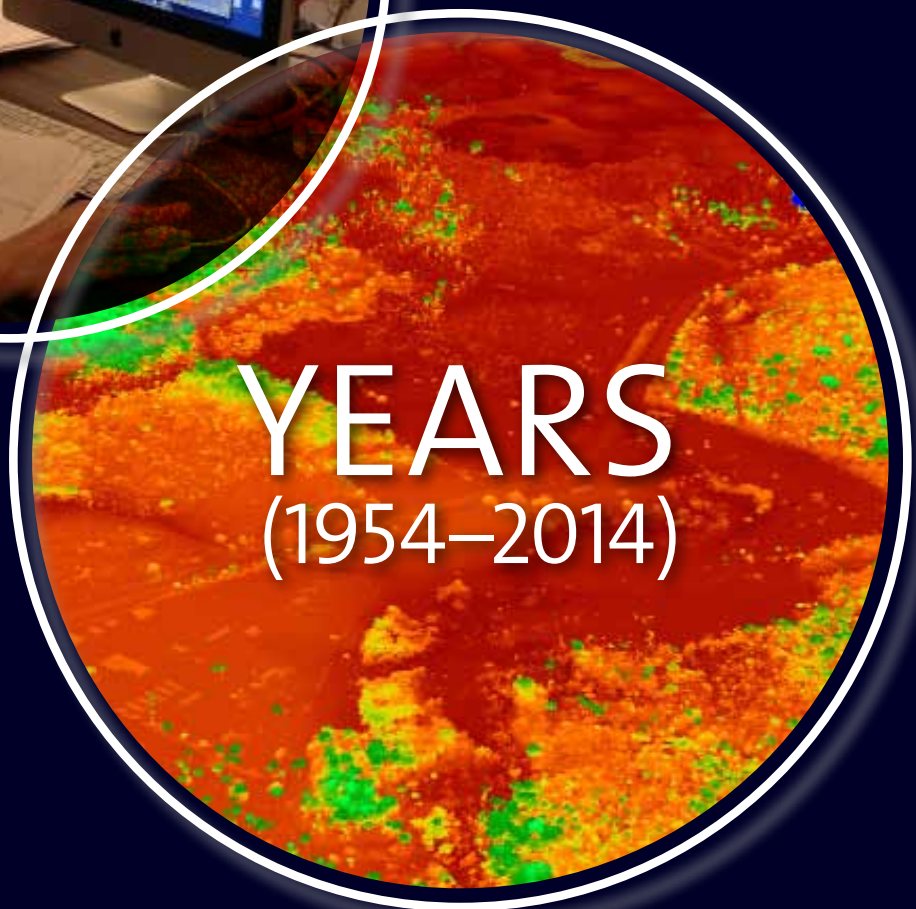
W. M. KECK FOUNDATION

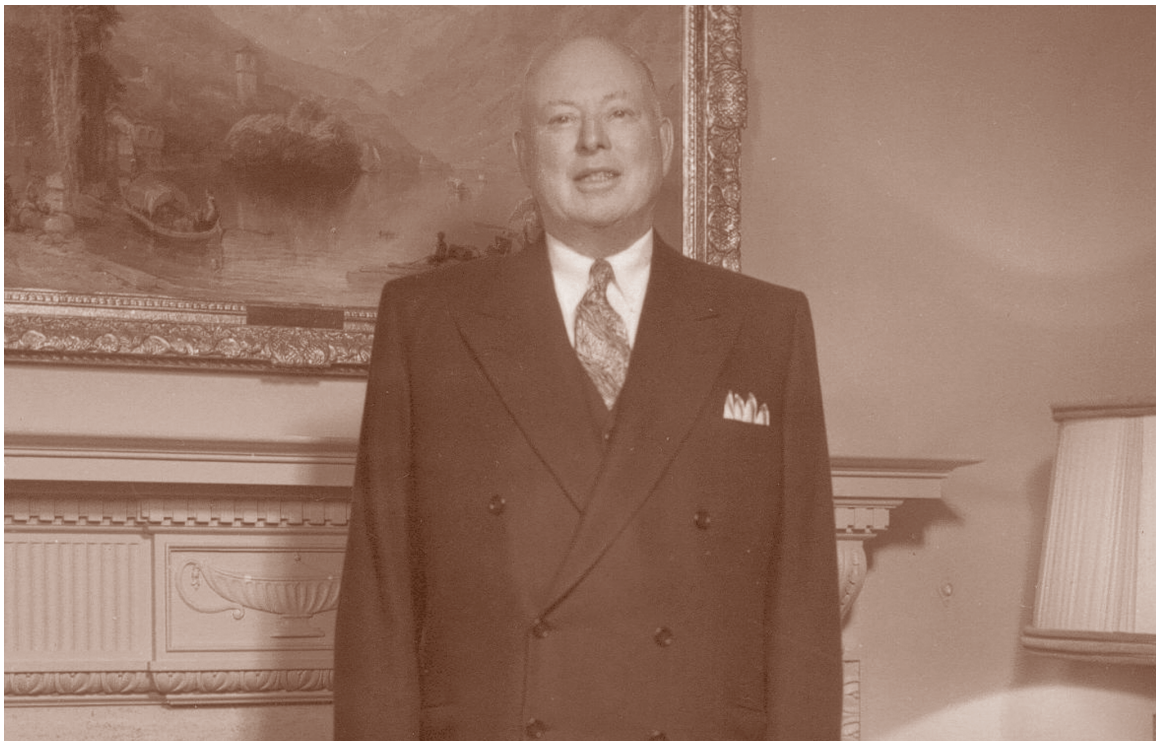
2014 ANNUAL REPORT



YEARS
(1954–2014)

COVER IMAGES:
Top: Undergraduate students work on a mapping project using state-of-the-art geographic information systems software

Bottom: Interdisciplinary team of scientists mapped unreported gold mining in the Peruvian Amazon and found that clandestine mines had increased greatly over 13 years and had tripled since the Great Recession



William M. Keck, Founder & President (1954 -1964)

W. M. KECK FOUNDATION

2014 ANNUAL REPORT

Howard B. Keck, Chairman & CEO (1964 - 1994) Robert A. Day, Chairman & CEO (1995 – Present)

W. M. KECK FOUNDATION

2014 ANNUAL REPORT

CHAIRMAN'S MESSAGE

As we celebrate the W. M. Keck Foundation's 60th anniversary, we reflect on the growth of our grantmaking through six decades of furthering our founder's mission: to provide far-reaching benefits to humanity by funding high-risk, high-impact scientific endeavors.

My grandfather, William Myron Keck, only went through the eighth grade in school. He left school to sell sandwiches on the railroad in Reading, Pennsylvania. He ended up working on a drilling rig. And this is where his legacy begins. W. M. Keck was a pioneer and an innovator. In 1921, he founded The Superior Oil Company. Mr. Keck's dedication, willingness to take calculated risks and strong interest in emerging technologies enabled Superior Oil to become a global leader in the exploration and production of oil and gas. He was the first person to do directional drilling in California in the 1930s. He was the first to use seismic technology to find oil in the mid-30s. He was the first to build an offshore platform off of Louisiana in the late-30s.

Innovation in the oil fields has translated into imaginative grants funding scientific breakthroughs and new technologies since 1954. By taking a bold, innovative approach to grantmaking, he created a legacy that my uncle, Howard Keck, Sr., upheld from the 1960s to the mid-90s, and that I have been proud to uphold for the past 20 years as only our third Chairman in 60 years.

Supporting pioneering discoveries in science, engineering and medical research has been and continues to be our mandate. In the area of education, we support undergraduate programs that promote inventive approaches to instruction and effective involvement of students in research. In Southern California, we support organizations that enrich the lives of our region's residents, particularly children, youth and their families.

As we take you through grants we have made in each of our six decades, you will find that each sparked the next level of excellence or inquiry in a bold way, whether that was building the ten-meter segmented mirror Keck telescopes or discovering the gene for Huntington's disease. These grants in turn have spawned further groundbreaking work. In Southern California, we also target projects that have an initial significant impact on our target population as well as a multiplier effect throughout our region. These grantees range from the Children's Bureau, at the forefront of preventing child abuse, to one of our most significant

partners, Keck Medicine of USC, a medical research enterprise for the twenty-first century. We are excited to continue our partnership with USC and the opportunity to facilitate outstanding research and improve the quality of life for people in the Los Angeles area.

The W. M. Keck Foundation relies on the experience and knowledge of its exceptional Board and Staff to continue funding the most high-impact projects. This year, I am pleased to welcome to our Board, Vernon E. Jordan, Jr. as Director and member of the Executive Committee. I am also pleased that the next generation of our family is increasing its role as well. I am happy to announce the election of Joseph Deegan-Day, Lucinda Day Fournier and Stephen M. Keck as Vice Presidents and the election of W. M. Keck III to our Executive Committee. Also, Jonathan Day has become a Foundation Member. I extend gratitude and thanks to our outstanding Board and Staff for their continued hard work and dedication – for it is their time, input and commitment that will continue W. M. Keck's legacy for many years to come.

The Foundation continues to prosper financially, with year-end total assets of $1.24 billion. When the Superior Oil Company sold in 1984, the Foundation's asset base was approximately $470 million. In 2014, the directors approved 67 grants totaling $40.7 million, and we distributed grants totaling over $59.7 million, including prior commitments and new awards. The Foundation is proud to have distributed over $1.7 billion to benefit science, medicine and other charitable causes in its 60 years. Through prudent financial stewardship, we look forward to funding exciting projects for many decades to come.

I am very proud of the foundation's achievements over the past sixty years. As we continue to venture into unknown realms of science and medicine, we will keep W. M. Keck's bold vision and calculated risk-taking as our guiding principles.

Sincerely,

ROBERT A. DAY
Chairman and Chief Executive Officer

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Community health and well-being

▲ Finger painting at Magnolia Place Preschool

▲ The excellence of an institution such as the Keck School of Medicine of USC can be measured by its personnel

Supporting Local Institutions

The Keck Foundation has committed more than $250 million to research and education at the Keck School of Medicine of USC.

The W. M. Keck Foundation's earliest grants set the course for its enduring commitment to Southern California, to education, to the welfare of its most vulnerable citizens, and to institutions critical to the region's civic and cultural interests. From its beginnings, the Keck Foundation has focused on children's health and well-being. This emphasis has continued as the Foundation's formal grant programs evolved and the Southern California Program adopted five distinct funding interests: arts and culture, early childhood development, health care, pre-collegiate education, and civic and community service. Through strategic investments in anchor institutions in each of these fields at timely junctures, we have contributed to these institutions' capacity to address urgent community issues.

Pediatrician Dr. Basia Tcheng providing care at Venice Family Clinic

The very first award the Keck Foundation made was a small grant in 1955 to Children's Hospital Los Angeles (CHLA). Over the next six decades, Children's Hospital grew as a premier pediatric academic medical center, and the Keck Foundation contributed to this key institution through grants totaling $5.6 million. As was typical for the Keck Foundation during this period, early grants supported general operations until the Foundation's grantmaking shifted to specific and strategic purposes, including campus expansion and programmatic initiatives. CHLA added new specialties to address the complex medical needs of its young patients and opened a state-of-the-art inpatient facility in 2011 supported, in part, by a Foundation grant. By tackling prevention of youth homelessness, the hospital has also taken on a community-focused role in areas not traditionally pursued by hospitals. Today, CHLA is rated one of the top five children's hospitals in the nation according to the 2014-15 US News & World Report Health Rankings.

As our region's institutions work together to better the community, the Keck Foundation support helps solidify this community fabric. Children's Hospital Los Angeles has been affiliated with the University of Southern California's medical school since 1932. The Foundation has committed more than $250 million to research and education at the

Taking advantage of the reading tree-house at Magnolia Place

CHILDREN'S BUREAU OF SOUTHERN CALIFORNIA

Innovation is in the DNA of Children's Bureau, which is at the forefront of preventing child abuse. Since the 1980s, the Keck Foundation has awarded grants totaling $3 million to support this anchor institution's evolving efforts. Children's Bureau's early approaches to child abuse prevention included the creation of the Family Assessment Form, a nationally recognized tool to assess family functioning and to plan treatment, with a focus on in-home counseling and parent education. In the 1990s, Children's Bureau established family resource centers and the dynamic NuParent education program for parents of infants and toddlers. In the 2000s, Children's Bureau launched the innovative Magnolia Community Initiative to transform a 500-block neighborhood in Los Angeles to promote success for all 35,000 children and youth living within its boundaries, particularly the youngest ones. A network of 75 partners is changing service practices to address the needs of children and families holistically. More than 100 resident ambassadors are engaging with their neighbors to create a sense of belonging and build on each other's strengths. The agency's Magnolia Place Family Center is now a hub for services, and the Magnolia Community Initiative is galvanizing residents to support one another, nurture their children and improve their communities.

Keck School of Medicine of USC (Keck Medicine) and has created new synergies among the Foundation, Children's Hospital and the medical school that have built national excellence in research, education and care. In 2003, the Foundation's grant to CHLA brought together its faculty, with faculty of Keck Medicine and residents of East and South Los Angeles, to launch an initiative to reduce obesity and diabetes. Children's Hospital continues to provide tools for healthy living, ranging from farmers markets to new fitness programs for younger children.

The Keck Foundation is committed to continuing to improve our community.

Like CHLA, the Southern California Program has responded to changes in community needs in all of its funding areas over its six decades of philanthropy. In its health care portfolio, the Program has prioritized projects that expand access to community-based health and wellness programs through the region's network of community clinics. For instance, the Keck Foundation first funded the Venice Family Clinic in 1983, and has since made other grants in support of new programs, most recently to create a family wellness complex. The Keck Foundation's strategic grants have also positioned other clinics to handle the influx

▶ One of the Venice Family Clinic's dental assistants, Elizabeth Huizar, RDA, helps a young dental patient

A young girl on the playground at Children's Hospital Los Angeles

of new patients only recently insured as a result of health care reform. Innovative facility designs enhanced the patient experience and improved efficiencies in order to serve more people. Other Keck Foundation grants allowed clinics to partner with schools to promote earlier access to preventive care and treatment for students and the surrounding community. All told, the Foundation has awarded 48 grants for community clinics totaling nearly $8.5 million.

Other Keck Foundation grants help bring community partners together to address multiple community issues in a single place. Keck grantee Hope Street Margolis Family Center, a program of the California Hospital Medical Center, utilizes numerous partners, including other Keck grantees Eisner Pediatric & Family Medical Center and Keck Medicine, to provide a continuum of educational, medical and developmental services from birth through adulthood. In a community with few if any parks, a 2011 grant enabled the Center to offer for the first time, an array of wellness and recreation activities to relieve stress, prevent obesity and provide quality time for families. The Center is now recognized as a national model for integrating health care within a community. The Children's Bureau of Southern California's Magnolia Place, which the Keck Foundation has supported with several grants, also gathers multiple providers, including grantee St. John's Well Child & Family Center. This initiative is creating sustainable change for families by promoting social connectedness and access to services (see sidebar – Children's Bureau).

Over the past six decades, our Southern California Program has awarded more than 1,000 grants totaling over $240 million to support organizations that promote healthy outcomes for children and families, facilitate academic achievement and build the region's civic and cultural infrastructure. The Keck Foundation is committed to continuing its support to improve our community. ■

Visitors to the Ecosystem's Forest Zone view kelp as if walking along the ocean floor

CALIFORNIA SCIENCE CENTER

Transforming a traditional science and industry museum into a new kind of public institution for science learning takes bold vision, resources and leadership that can see a long range plan through to completion. Investments by the Keck Foundation in each phase of the California Science Center's 25-year master plan have helped establish it as a go-to destination that inspires young people and promotes public understanding of science. The first phase opened in 1998 with the hands-on *World of Life* and *Creative World* exhibit galleries. Since then, over 27 million people have visited and yearly attendance has doubled from 1.2 to 2.5 million. One of the most popular attractions, which the Foundation supported as part of the first phase, is Tess, a 50-foot-long animatronic model of the human body showing how life depends on many physiological systems working together. In the second phase, the Center added another Keck-supported exhibit wing, *Ecosystems*, exploring the science of ecology through different environments with live plants and animals. The California Science Center is now constructing the Samuel Oschin Air and Space Center, which will have three major galleries and feature the wildly popular Space Shuttle Endeavor. The *Space Gallery* will focus on exploration of the farthest reaches of the universe. An exhibit on stars and telescopes, supported by the Foundation, will highlight the Keck Observatories. The Keck Foundation has awarded grants totaling $5.4 million to this anchor institution devoted to both science and education.

Endeavor in its temporary home, the Samuel Oschin Pavilion

Stimulating New Approaches

▶ Undergraduate students work on a mapping project using state-of-the-art geographic information systems software

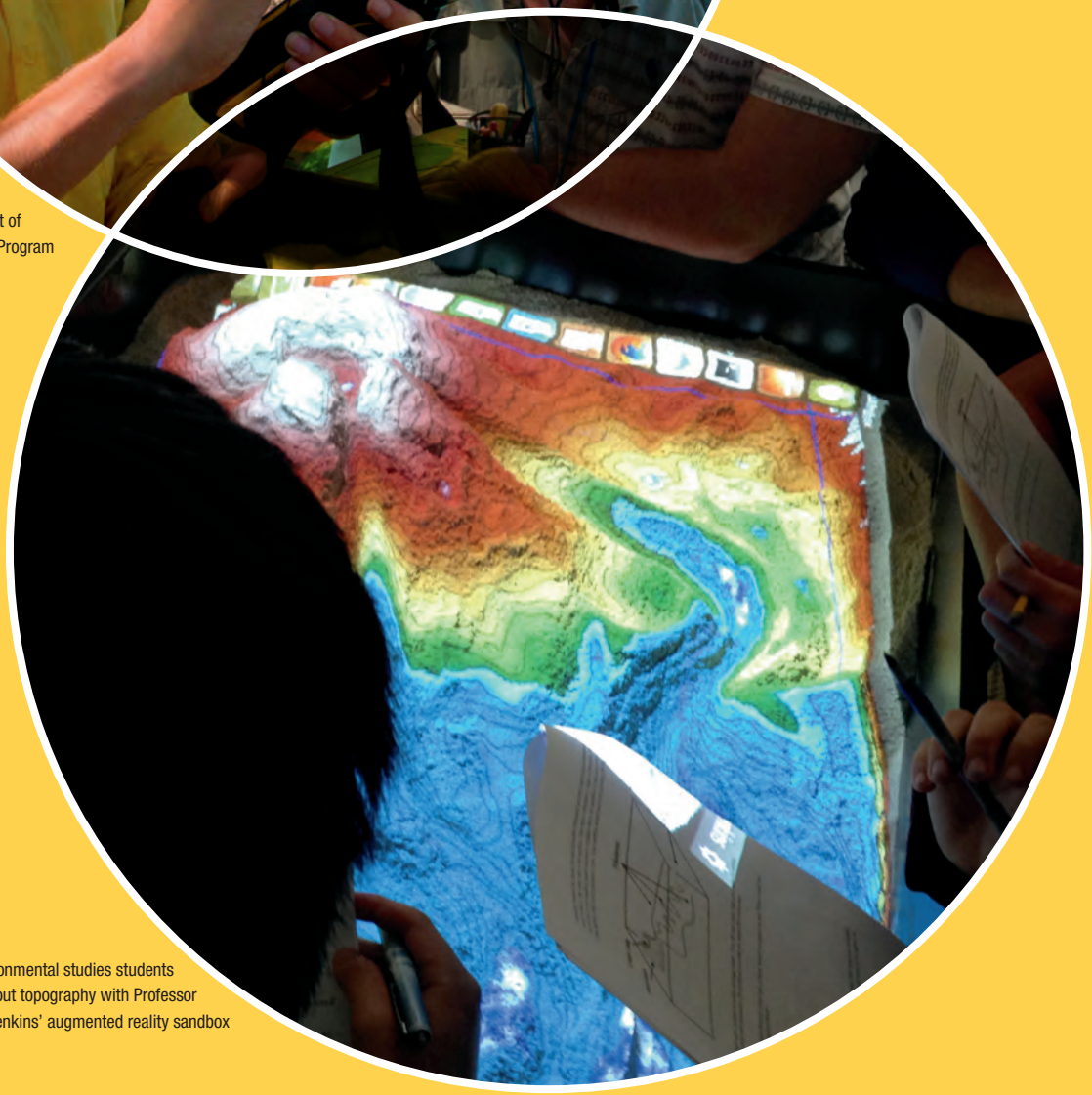
Location, location, location! Geography matters at the University of Redlands, a small liberal arts university in Southern California. And it all started during the W. M. Keck Foundation's second decade, when the campus received three modest Foundation grants totaling $25,000. They were for unrestricted support, as was generally the case with Foundation grantmaking during this period. Continuing to focus on building capacity for science education at local, primarily undergraduate institutions, the Foundation awarded $2.5 million to Redlands to construct science buildings. When the Keck Foundation's undergraduate program ceased funding capital projects in 1997, its focus shifted to funding curriculum development and equipment. In the case of Redlands, this coincided with the university's emergence as a leader in geographic information systems (GIS). GIS would seem an unlikely niche for a liberal arts institution were it not thanks to geography itself, as the university is located in the same city as Esri, the world leader in producing commercial GIS software. By the 1970s, Esri was automating manual map-making processes; and by the 1980s, it was fully engaged in developing GIS software. In the meantime, the small town atmosphere of the city of Redlands made it inevitable that the growing company and the university would become acquainted. In 2001, a partnership materialized when the university began a GIS masters degree program with substantial support from Esri. The program has grown in size and reputation ever since.

The US Department of Labor has identified spatial technology, alongside nanotechnology and biotechnology, as one of the three most important industries of the 21st century.

In 2007, the university committed to build on the masters program by offering GIS to its undergraduates and hired geographer Diana Sinton to lead this endeavor. She arrived on the campus with a broad vision, talking about "spatial literacy" and "place-based curricula" as approaches to stimulate integrative, real-world learning. Faculty began working with her to pilot this approach across many disciplines. In conversations with the Keck Foundation, Sinton and the early adopting faculty emphasized that the endeavor was not "just GIS" but an expanded and more generally applicable approach to a new curriculum. Half of the 15

Providing invaluable experience to students

▲ Lucas Wilgers (left) and Nathan Haag (right) collecting GPS data as part of the Tetiaroa Geodatabase Program in Tahuna Iti, Tahiti



▶ Environmental studies students learn about topography with Professor Hillary Jenkins' augmented reality sandbox

PEPPERDINE UNIVERSITY

The W. M. Keck Foundation's undergraduate program seeks projects that incorporate authentic research experiences into coursework. Pepperdine University chose to experiment with this goal in its existing freshman seminar program. The campus already had a strong summer research program in the sciences; but Pepperdine wanted more students to experience research early in their academic careers and across the disciplines. A Keck Foundation grant in 2010 enabled up to ten faculty each year during the grant period to offer seminars based on research practices. There are now over 300 alumni of these seminars, and over 60 have received seed grants to continue their research with support from a faculty mentor. Upperclassmen serve as peer mentors who help the freshmen and faculty as they all learn the different facets of research methodology of each academic discipline. These include studies of original literature, data collection and analysis, and communicating effectively in both written and oral formats. One of the mentors, who had her first research experience as a senior, said "I wish I did this as a freshman!" Since the Keck Foundation grant in 2009, that opportunity is now an invaluable experience available to all students at Pepperdine.

Top and bottom: Freshmen engaged in field research measuring photosynthesis on native plants in situ

pilot courses did not directly involve GIS at all, instead using a variety of maps and other representations of spatial data. Involving students in the process of choosing which of these tools were most suitable for answering the questions at hand, increased the level of student involvement. A religion course livened up after the geographical sites of miracles described in the Bible were mapped and found to reveal contradictions. A course taught by a team of three faculty members pushed interdisciplinary thought when time-series maps of population migration and ground water distribution were studied in order to better understand the spread of disease. Something different was happening. The evident benefits of spatial literacy, all in keeping with the Foundation's emphasis on heightened student and faculty engagement, resulted in a 2009 grant to support three years of continued work.

Each year of the project followed a different theme: mapping people, mapping movement and mapping community.

Students in Professor Tim Krantz's May-term Environmental Studies class conduct kite aerial photography on Tetiaroa Atoll in the south Pacific

Students presenting their research results

CALIFORNIA POLYTECHNIC UNIVERSITY, SAN LUIS OBISPO

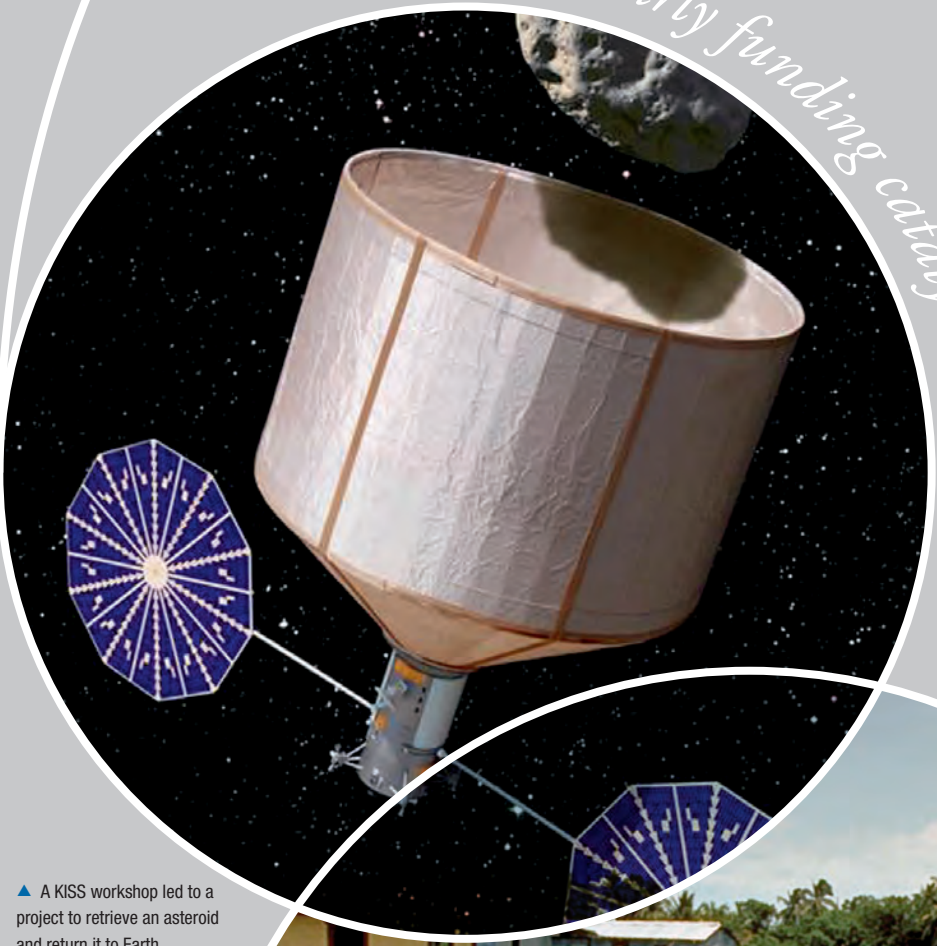
Cal Poly San Luis Obispo has a longstanding reputation for generating collaborative, hands-on learning among diverse students and faculty. In 2009, a team of faculty representing the colleges of science, engineering and agriculture approached the Keck Foundation for funding to start a multidisciplinary program in molecular forensics that spans all four years of a student's academic career. The idea was to acquire DNA sequencing instruments capable of rapid analysis of microbial genome sequences for real-world studies of food and water safety. The project is a resounding success. The research-based curricular approach and the growing database of microbiological pathogen genome sequences are being widely shared with other campuses. Cal Poly returned to the Keck Foundation a few years later with an even more ambitious plan to launch a program in the management of waste streams related to nanotechnology. The faculty team identified 28 courses in nine disciplines, both technical and nontechnical, that will incorporate aspects of this timely and largely overlooked topic. Much of the impetus for the project came from the founding in 2009 of the Global Waste Research Institute that received substantial support from Cal Poly's many industrial partners in the region. The Keck Foundation made the grant in 2013, and the work is well underway.

The themes set a distinctive tone for each year's five-day summer institute that included external experts, Redlands faculty and faculty from other campuses who expressed interest in spatial literacy. Student interns were also included in brainstorming sessions that prepared them for peer mentoring in the following academic year. Out of these activities, the plan to involve more faculty was steadily implemented. With GIS support from graduate student researchers with the masters program, Redlands faculty integrated spatial literacy into their undergraduate classes. An archaeology professor increased his expertise in GIS and used it to involve students in a collaborative project with the Hopi tribe to study and preserve the history of interaction among landscape, architecture and the Hopi culture. A biologist has incorporated the role of underwater space in marine ecosystems, particularly with her focus on the behavior of river otters and grey whales along the Pacific Coast. And a faculty member in history invoked the role of place in understanding how a Sufi Islamic culture adaptively developed in Senegal during the challenging phases of colonization.

> *The concept of spatial literacy has been spreading nationwide.*

In fall 2013, the university began offering a minor that quickly became the most popular in the university. The project culminated in the establishment of a Center for Spatial Studies in 2014. Meanwhile, the concept of spatial literacy has been spreading nationwide. Most prominent among these new programs are those at the University of Southern California and the University of Minnesota, who with Redlands and Esri, are now leading the debate about what might define a "spatial university." The US Department of Labor has identified spatial technology, alongside nanotechnology and biotechnology, as one of the three most important industries of the 21st century. The future significance of location, location, location! is guaranteed, and Redlands is right at the heart of it. ■

Early funding catalyzes new ideas



▲ A KISS workshop led to a project to retrieve an asteroid and return it to Earth

▶ Keck funding allowed HDF researchers to purchase chalanas so they could reach the HD families living on Lake Maracaibo

Seeding Innovation

Important discoveries often start small, but seeding key ideas with funds to start exploring can have a huge impact on outcomes. In 1983, the W. M. Keck Foundation began collaborating with the Hereditary Disease Foundation (HDF), which *"uses Huntington's disease (HD) as a model for hereditary disease research because it is triggered by a mutation of one single gene."* From its onset in early to mid-adulthood, HD destroys brain cells, leaving victims unable to control their movements, and bringing on severe personality and cognitive declines, then death. The collaboration between the Keck Foundation and HDF began with the saga of a group of gene hunters determined to track down the cause of this devastating disease and find a cure. Thanks to four Keck Foundation grants to HDF, totaling $2,075,000, the gene responsible for HD has been located and the search for a cure is under way.

The flexibility of Keck funding was crucial to finding the HD gene.

The story of the identification of the HD gene has closely paralleled the development of the Human Genome Project.

By 1983, Nancy Wexler, whose father founded HDF, had located a group of families with a high incidence of HD living in stilt houses in the village of Laguneta on Lake Maracaibo, Venezuela. The Keck Foundation funded HDF to travel to Laguneta to collect blood and other samples as well as detailed family histories. The flexibility of Keck funding was crucial, according to Wexler, because she had no other way to purchase chalanas, motorized canoes, to reach the villagers.

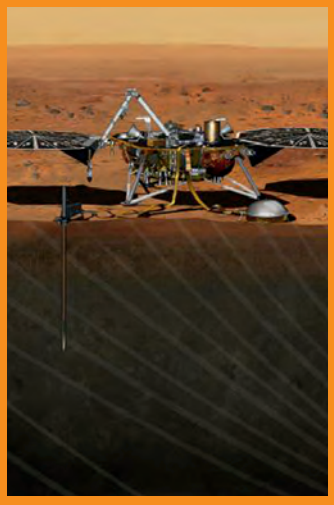
The hunt was now on to find the location of the HD gene on the human genetic map. In the early 1980s, this was a laborious task which required searching for DNA markers close to the gene that would constitute a starting point from which to seek the gene itself. A marker was finally found on chromosome 4 in 1987. The discovery, pinpointing the probable location of the HD gene, garnered media attention, from *Time* magazine to *60 Minutes*. In 1988, the producer of Nova wrote *"Your work, funded by the W. M. Keck Foundation and the National Institutes of Health, spans oceans and cultures. It is both high-tech and human."*

▶ HD symptoms can appear at many different ages; the reasons are not all understood

The search intensified for the gene itself. In an inspiring example of scientific collaboration, six laboratories in the US and abroad agreed to join forces in the search. Known as the Huntington Disease Collaborative Research Group, they finally found the gene in 1993, on chromosome 4, as predicted. On the way, many new techniques for handling and manipulating DNA were developed and applied to other problems. The group also discovered that the HD mutation is unusual in that it occurs in a region consisting of a sequence of three DNA bases repeated multiple times and known as a trinucleotide repeat. Normal copies of the gene have 11 to 34 repeats while HD individuals have 35 to 100. Expansion of trinucleotide repeats is now known to be a feature of other conditions characterized by muscular and cognitive deficits.

We predict that, as in past studies, it is likely that new methods and insights will spring from this work and will be applied to other genes and conditions.

Many Venezuelan families with HD live in stilt houses on Lake Maracaibo



A KISS workshop and seed funding led to the design of the next vehicle to land on Mars

THE KECK INSTITUTE FOR SPACE STUDIES (KISS)

The W. M. Keck Institute for Space Studies (KISS) at Caltech was created in 2008 to develop revolutionary new scientific and technical approaches for future space missions. KISS is a partnership between Caltech and the Jet Propulsion Laboratory (JPL) that also includes scientists and engineers drawn broadly from academia, government and industry. From its inception, KISS was designed not just as a think tank but as a "think-and-do tank." Workshops held throughout the year bring together multi-disciplinary cadres to discuss, disagree and decide next steps for innovative science and space missions (the thinking part). Seed grants to workshop participants enable pilot studies to see which out-of-the-box idea might work (the doing part).

In a few short years, several KISS projects have been selected by NASA for further funding. The most ambitious is the asteroid retrieval mission. NASA has accepted several proposals for studies to capture a small asteroid in space or retrieve a boulder from a larger asteroid. Research from another KISS development project enabled the first age-dating of a rock on another planet—Mars—through analysis of its mineral composition.

With many parallels to the Futures Initiative project (see sidebar – NAKFI) the KISS award showcases the Keck Foundation's support of multi-disciplinary work leading to revolutionary results.

HDF president Nancy Wexler with the HD pedigree

It was 1993 and as the Human Genome Project ramped up, many HD researchers turned to that effort. As the sequencing of other genes progressed, the ability to determine whether a person had inherited the HD gene rose to nearly 100%. However, no treatment or cure was available. As the Human Genome Project neared the first draft sequence of the entire human genome, HDF researchers observed that the number of repeats in HD genes also correlated well with age of onset and severity of symptoms, though not entirely. This raised the possibility that other genes and environmental factors influence disease progression. These insights were only possible because of the continuing addition of new samples and data from the Venezuelan Kindred dataset. Pedigree data for 18,000 individuals along with blood and sperm samples and the brains of deceased affected individuals are now preserved at the New York Genome Center. The result is a priceless shared resource.

In 2014, as the cost of sequencing the entire genome of an individual dropped to a mere $1,000, the opportunity arose to use the Venezuelan Kindred dataset to study the effects of other genes, called modifiers, on HD. Powerful new technologies for studying brain tissue also recently became available. Combining these state-of-the-art technologies to unravel the circumstances, genetic or environmental, that contribute to age of onset and severity of symptoms was the focus of the most recent Keck Foundation grant to HDF. As Wexler put it in a letter thanking the Keck Foundation for this grant, *"All of the most sophisticated, rapid, in-depth and catalytic ways of divulging biological secrets are poised to make progress. We will find new treatments and cures for HD and other brain bandits."* We predict that, as in past studies, it is likely that new methods and insights will spring from this work and will be applied to other genes and conditions. ■

Opened in 2002, the Keck Center of the National Academies in downtown Washington DC houses more than 1,000 employees and is a popular site for scientific meetings

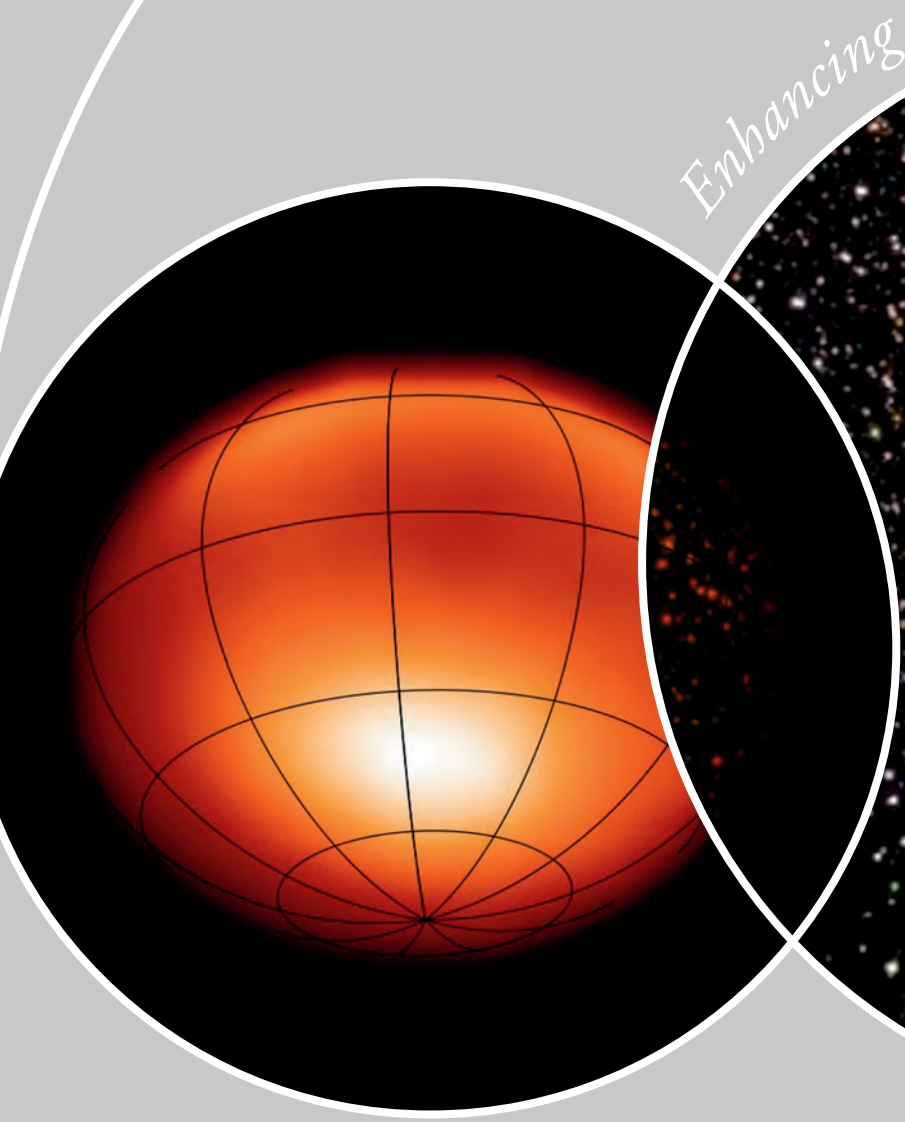
THE NATIONAL ACADEMIES KECK FUTURES INITIATIVE (NAKFI)

The National Academies Keck Futures Initiative (Futures Initiative) was launched in 2003 as a 15-year experiment to catalyze interdisciplinary research across science, engineering and medicine. The Futures Initiative sparks innovation. It starts conversations, incubates ideas, transforms careers, provides a source of science venture capital and enables unexpected outcomes. Before the annual conference, the invited participants study each other's methods and vocabulary through a series of pre-conference tutorials. Futures Initiative conferences ask scientists, engineers and science writers to engage with each other around specific problems in small working groups over three days. This forces in-depth conversation and allows potential collaborations to emerge. The mix of disciplines in the room yields unexpected insights. Follow-on seed grants allow these insights to be tested, examined and re-formulated. Testimony from numerous Futures Initiative participants attests to the usefulness of networking with researchers from other fields, enabling them to think about scientific questions in new ways.

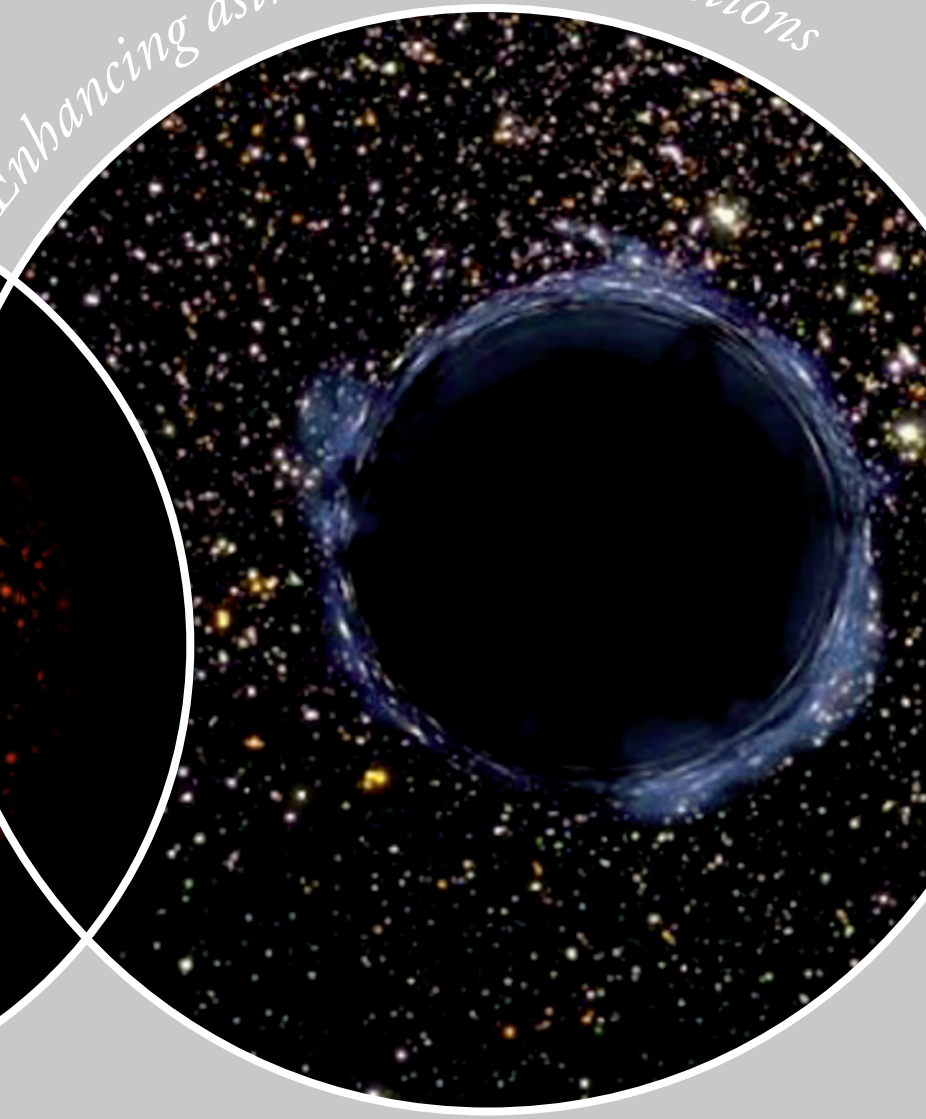
With many parallels to KISS (see sidebar – KISS), the Futures Initiative showcases the Keck Foundation's support of multi-disciplinary engagement leading to unexpected collaborations and outcomes.

NAKFI symposia, each on a different interdisciplinary topic, are chronicled in yearly reports

Enhancing astronomical observations

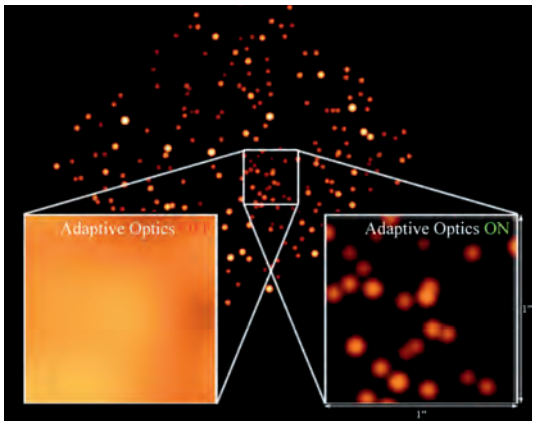


▲ Alpha Cephei, also known as Alderamin, rotates so rapidly that it has a markedly oblate surface shape; the image shows polar brightening and equatorial darkening resulting from the oblateness



▲ An artist's impression of a black hole

Telescopes *and* Adaptive Optics



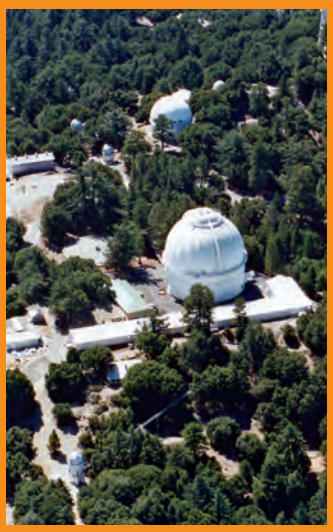
Observations of stars surrounding the black hole in the center of our galaxy without (left) and with (right) adaptive optics

A team of scientists led by Jerry Nelson at the Lawrence Berkeley National Laboratory conceived the design for a pioneering ground-based telescope in 1977. It was based on combining 36 mirrors (nearly two meters each) to assemble a deformable ten-meter segmented mirror. It made possible larger, more powerful telescopes than ever before. In 1985, the W. M. Keck Foundation provided a grant of $70 million toward constructing this new segmented mirror telescope in Hawaii. Construction of Keck Telescope 1 (Keck 1) began in 1985, and first light was in 1990. The overwhelming success of the ten-meter segmented mirror design prompted further funding from the Keck Foundation, followed by support from NASA, to build and operate a second telescope (Keck 2). First light for Keck 2 was in 1996. These two telescopes are now the two most productive ground-based telescopes for optical infrared astronomy, as measured by publications per telescope. The Keck Observatory (Keck 1 and 2) is a premier facility for astronomical observations, and ongoing upgrades have kept it at the forefront.

An adaptive optics system improves the sharpness of the image in an optical system by using a sensor to reduce the effect of these atmospheric distortions.

Leadership in construction, operation and management of this astronomical facility has been essential to the success of the Keck Telescopes. This is provided by the California Association for Research in Astronomy (CARA). Based in Hawaii, CARA has six directors, three appointed by Caltech and three by the University of California. Time allocation on the telescopes for astronomers at Caltech, the University of California, the University of Hawaii system and NASA is overseen by each of these partners. Periodically, the National Science Foundation and the National Optical Astronomy Observatory provide support which results in allocation of observational time to other scientists.

When light from an astronomical object enters Earth's atmosphere, atmospheric turbulence distorts the image. An adaptive optics (AO) system improves the sharpness of the image in an optical system by using a sensor to reduce the effect of these atmospheric distortions. The Keck Foundation funded the application of AO on large (eight- to



Aerial view of Mount Wilson

MOUNT WILSON OBSERVATORY

The Mount Wilson Observatory is a historic scientific landmark overlooking Los Angeles. The site of many breakthroughs in astrophysics during the early 20th century, the observatory is still in use, albeit more for astronomy students and enthusiasts than for modern science. There is an exception, however – Georgia State University's Center for High Angular Resolution Astronomy (CHARA). Nestled among the other sky-gazing instruments on Mount Wilson, CHARA is an array of six telescopes that uses the technique of interferometry to provide a higher resolution than any single telescope could provide at visible and near-infrared wavelengths. Built with funds from Georgia State University, the National Science Foundation and the Keck Foundation (which enabled the crucial sixth telescope), CHARA became fully operational in 2004 and is the highest resolution instrument of its kind in the world. Since then, this facility has generated more than 100 peer reviewed publications announcing such breakthroughs as the first direct detection of gravity darkening on a single star, the first angular diameter for a halo population star, and the first image of a binary star system in eclipse. The director of CHARA, Hal McAlister, also served for many years as director of the Mount Wilson Institute that stewards the entire mountaintop. In this capacity, he steadily returned the site to prominence for its historic significance as well as its ideal suitability for undergraduate research and public outreach.

ten-meter) telescopes by pioneering its implementation on Keck 2. The successful deployment of a segmented mirror telescope with AO technology at the Keck Observatory has been followed by two new, much larger ground-based telescopes: the Thirty Meter Telescope in Hawaii and the European Extremely Large Telescope in Chile. This is a monumental testament to the pioneering vision of Keck 2.

The Keck Foundation funded the application of AO on large (eight- to ten-meter) telescopes by pioneering its implementation on Keck 2.

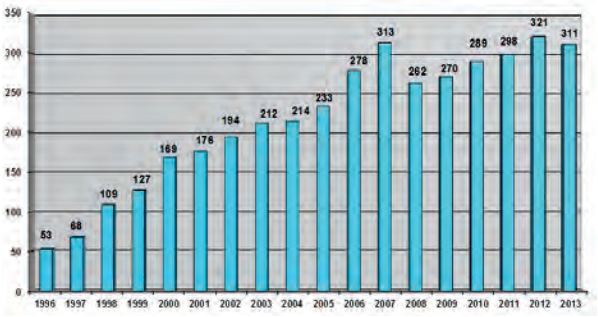
The Keck Observatory has hosted significant, high-impact research in astronomy and cosmology. One such example is the study of black holes. It is impossible to see a black hole directly. However, if a star is near a black hole, observing its orbital motion as it is controlled by the gravitational mass of the black hole can lead to a better understanding of these strange astronomical objects. A team of scientists at UCLA, headed by Andrea Ghez, has tracked the orbits of stars close to the black hole at the center of our galaxy, Sagittarius A*. Using the Keck telescopes, Ghez and her colleagues have imaged the galactic center at infrared wavelengths and, thus,

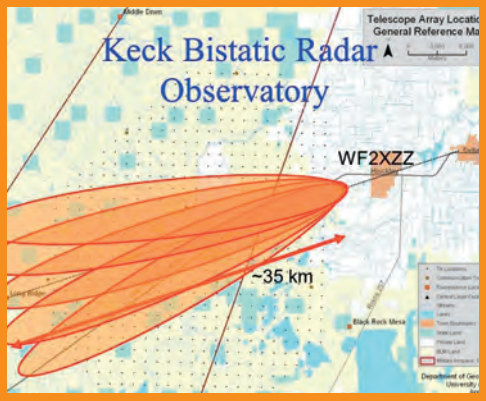
▶ Keck 1 and 2 lasers are creating an artificial guide star for the adaptive optics system to aid observations of the Milky Way's black hole

have been able to "see" through the heavy dust that blocks visible light. The high resolution infrared images have made it possible to follow the orbits of stars around the black hole. These measurements, as well as improving our understanding of black holes, may provide a test of Einstein's theory of gravity. Ghez's team has also determined the mass of Sagittarius A* at 4.1±0.6 million solar masses. There are many similar examples of exciting research based on Keck Observatory data. The hundreds of papers published each year in peer reviewed scientific journals are a tribute to the Observatory's impact on optical astronomy.

But, AO is not limited to telescopes. Its successful demonstration has inspired scientists in other fields, notably biology, to use the principles of AO to build more efficient optical devices for solving critical problems in the life sciences. For example, a Keck Foundation-funded team at the University of California, Santa Cruz, has successfully demonstrated the feasibility of AO for imaging molecular changes in single cells. They have developed a microscope equipped with the sensing systems and deformable mirrors characteristic of AO and are testing this new technology in a variety of model systems. This could lead to early detection of diseases and could provide tools for basic biological studies. ■

Number of Keck Observatory publications/year





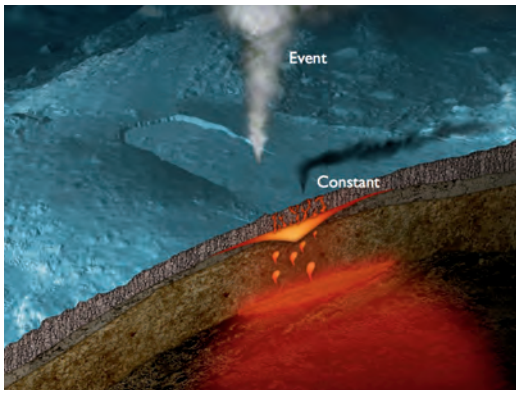
The Keck Bistatic Radar Observatory transmits radio waves over 35 km long areas searching for evidence of ultra-high energy cosmic rays

UNIVERSITY OF UTAH

Elementary particles are the building blocks of the universe. Our understanding of these particles results from colliding them with each other at high energies in a particle accelerator. The fragments from these collisions are analyzed to understand the parent particles. The Large Hadron Collider (LHC) is the world's most energetic particle accelerator. However, particles generated by the LHC possess energies that are more than a million times smaller than the ultra-high energy cosmic rays (UHECR) that bombard Earth's atmosphere. Currently, the focus of UHECR research is on understanding their sources and acceleration mechanisms. Air showers are an extensive (a few kilometers wide) cascade of ionized particles and electromagnetic radiation produced when a cosmic ray interacts with the atmosphere. Work supported by the Keck Foundation at the University of Utah aims to increase the probability of UHECR observation by increasing the detector area to 4,000 square kilometers or more. The Utah team uses a 40 kilowatt VHF transmitter broadcasting toward a receiver over the Northern Hemisphere's largest conventional cosmic ray observatory – the Telescope Array – in radio-quiet western Utah. This location optimizes the likelihood of successfully demonstrating this remote sensing technique, which could provide scientists with a new tool for investigating the Universe's most energetic particles.

Remote Sensing

On land, scientists can continually monitor almost anything, from ecosystems and seismic activity to the ever-changing characteristics of the atmosphere. Under the sea, however, scientific observations are much more limited and challenging. Specialized research vessels are expensive to operate, and severe weather can restrict work or even stop it entirely. Oceanographic research conducted by ship yields, at best, uncollated snapshots of the ocean. Collecting continuous data can be difficult or impossible. A new approach to studying the oceans was, therefore, needed.



▶ Detectors monitor the entire Juan de Fuca tectonic plate

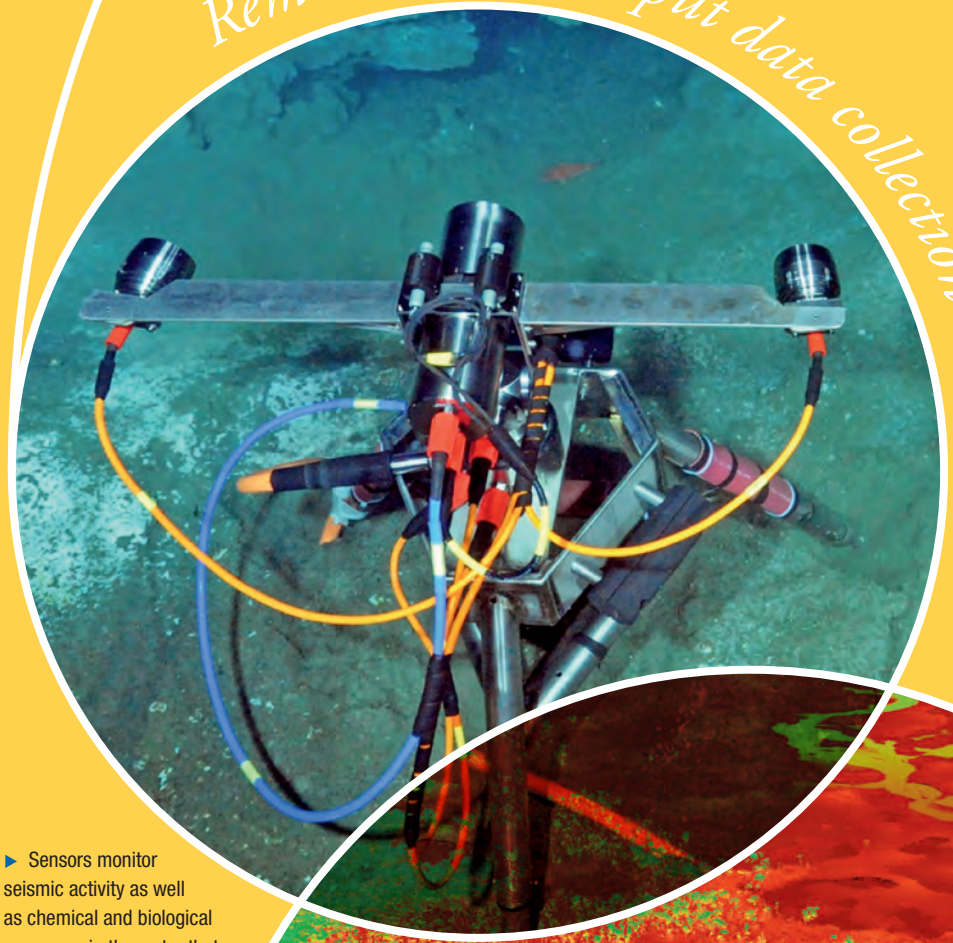
In 2001, University of Washington (UW) oceanographer John Delaney and his colleagues presented an idea that would change the way the ocean is studied. They approached the W. M. Keck Foundation with an ambitious plan for wiring the Juan de Fuca tectonic plate off the Pacific Northwest coast to create a constant virtual presence in the Pacific Ocean. The wide variety of geological processes occurring at the edges of this tectonic plate made it a perfect choice for marine geophysicists, and its relatively small size meant that the entire plate could be equipped with sensors for remote data collection.

The concept, named Project NEPTUNE (North-East Pacific Time-series Undersea Networked Experiments), consists of a sophisticated network of sensors and autonomous observatories across the seabed, all linked to the Internet by high-speed, fiber-optic cables. The Keck Foundation supported the development, deployment and testing of new sensor instruments along the continental margin and in the deep ocean. NEPTUNE was also conceived in concert with a similar system for deep-ocean sensing in Canada that is now part of Ocean Networks Canada.

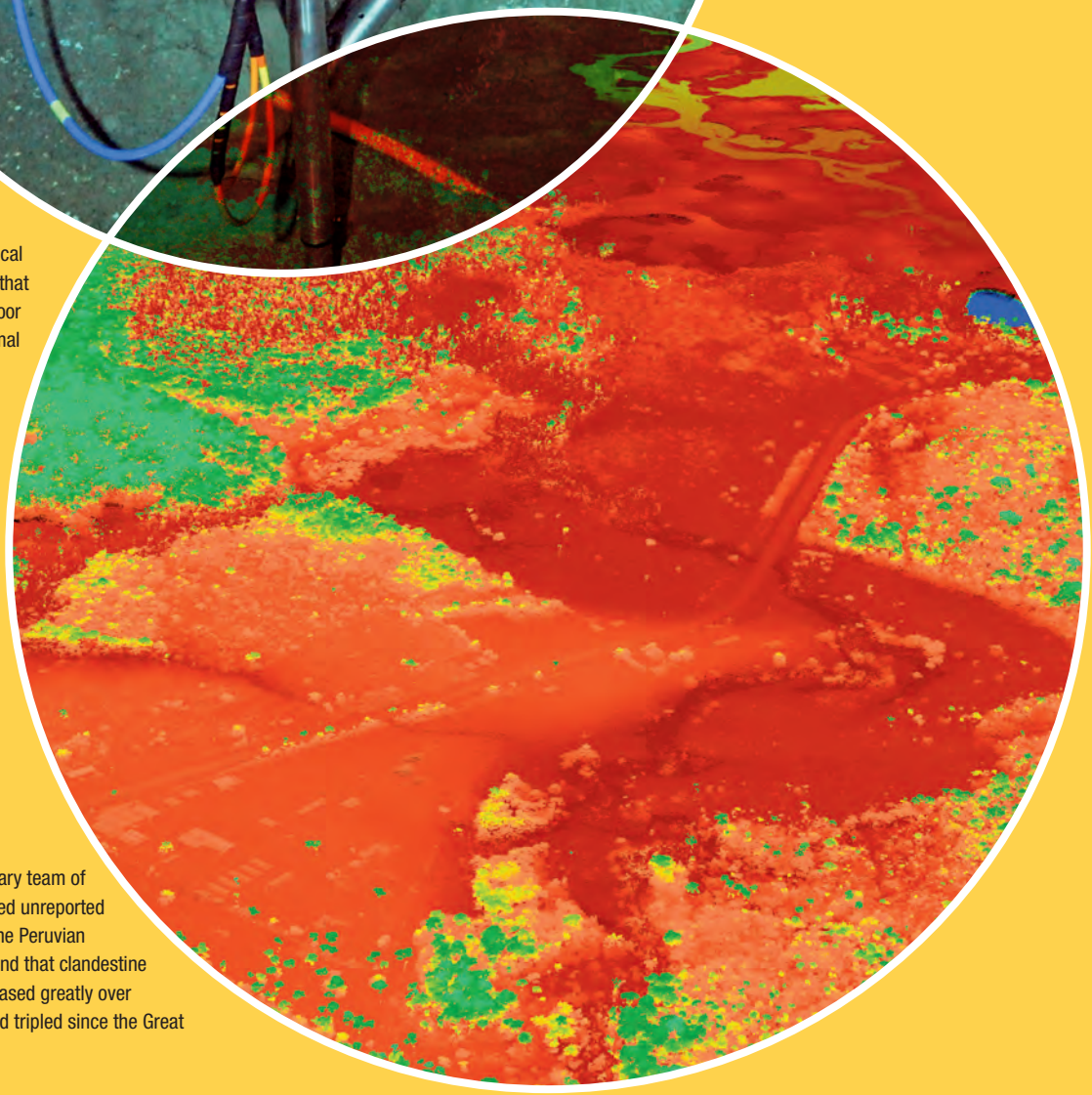
The Keck Foundation supported the development, deployment and testing of new sensor instruments along the continental margin and in the deep ocean.

The NEPTUNE array in effect transformed the Juan de Fuca plate into a national laboratory and allowed scientists to study deep-ocean waters and more than a half-million square kilometers of the ocean floor without ever leaving their own research laboratories. A number of robot submarines were also available for missions at short notice to investigate new seafloor eruptions or other events. Having the entire Juan de Fuca plate wired allowed the UW team to explore the way that plate tectonics affect the ocean floor and marine life

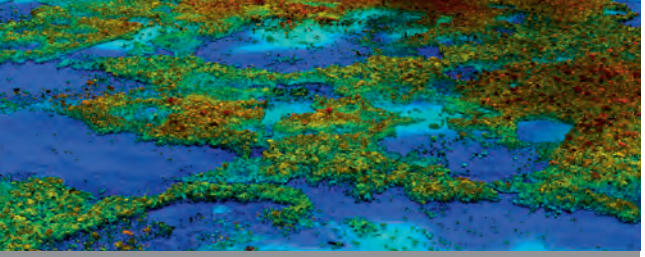
Remote sensing to put data collection within reach



▶ Sensors monitor seismic activity as well as chemical and biological processes in the water that flows from the ocean floor in response to geothermal activity



▶ Interdisciplinary team of scientists mapped unreported gold mining in the Peruvian Amazon and found that clandestine mines had increased greatly over 13 years and had tripled since the Great Recession



High-resolution imaging of environmentally complex regions; the blue portions show where Amazonian rainforest has been razed for cattle grazing

CARNEGIE INSTITUTION OF WASHINGTON

The environment is susceptible to many types of manmade and natural alterations, such as changes in land use, deforestation, introduction of invasive species or responses to climate change. These many variables affect agriculture, fisheries and our quality of life. Understanding how all of these factors interact and how the environment responds to changes requires methods to assess the natural resources that currently exist and determine where they are located.

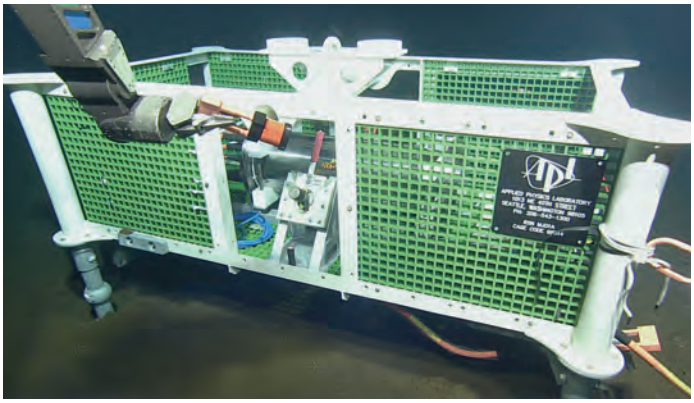
In 2005, the Carnegie Institution of Washington proposed to develop new remote sensing technology to permit unparalleled monitoring of ecosystem changes. The research team created a lightweight platform called the Carnegie Airborne Observatory (CAO) that could be mounted on small airplanes. The CAO combined a high-fidelity imaging spectrometer with full-waveform LiDAR (Light Detection and Ranging), a mapping and detection system that works on the same principle as radar but uses laser light.

Within three years of operation, the CAO was recognized globally as a premier ecosystem technology for mapping and monitoring the environment. The data collected using the CAO has supported more than 90 scientists in 11 countries and studies ranging from aquatic chemistry and ecosystem dynamics to volcanic terrain modeling. This technology recently led to the first high-resolution carbon geography of Peru, whose tropical forests are among the most vital in terms of understanding ways to mitigate the impact of global climate change.

Specialists from the Carnegie Institution and the Peruvian Ministry of Environment in front of the Keck-supported Carnegie Airborne Observatory, which uses laser light to image vegetation at high resolution in 3D

in ways that had never been possible before. The first live transmission of high-definition images from the ocean floor occurred in 2005. The last elements of the network were installed in 2014.

The project's scientists created sensors that were capable of studying not only seismic activity but also chemical and biological processes in the mineral-rich water that flows from the ocean floor in response to thermal activity. Coldwater seeps and hydrothermal vents known as "black smokers" cluster along plate boundaries, and active vents harbor distinct microbial communities. Other sensing devices record acoustic events associated with the smokers, and methods were developed to study the plankton and microbial life that forms the basis of the ocean food chain. The UW team created the first on-site DNA analyzer, which was deployed at both shallow and deep-water sites. The continuous, real-time information that these sensors provide will be used to investigate the health and migration of fish stocks and marine mammals and



An undersea observatory created for NEPTUNE with 30 titanium lab modules that encircle most of the Juan de Fuca plate deployed at the base of a submarine volcano

to seek new pharmaceuticals from the sea; it could even inform models of aquatic life on planetary bodies outside Earth such as Jupiter's moon Europa, which is believed to have oceans of water beneath its icy crust.

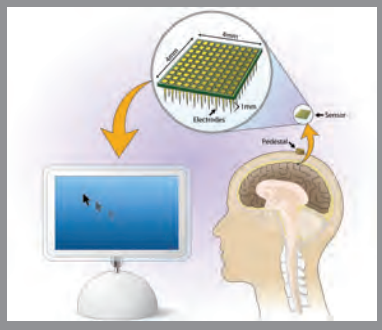
One of the most important potential consequences of the NEPTUNE project is the ability to track the day-to-day evolution of seafloor volcanoes. In 2014, the high-speed connections linking a network of underwater observatories and onshore seismic sensors were completed for the active volcano known as the Axial Seamount, located about 250 miles off the Oregon coast. By studying the ground deformation and other evidence during an eruption cycle, researchers will attempt to identify changes that can be used to predict future underwater eruptions, which can sometimes trigger devastating tsunamis.

Monitoring underwater volcanoes has also revealed surprising biological phenomena linked to eruptions. One

BROWN UNIVERSITY

Millions of individuals annually experience neurodegenerative disease, strokes or traumatic brain injury. The resulting paralysis can be devastating, leaving some with an active mind trapped in an immobile body. Clinicians cannot repair the damage in most of these people but may be able to restore some physical independence and mobility. Brown University proposed to investigate biochemical signaling between neurons and how the brain processes motor signals for specific movements. A 1999 Keck grant allowed researcher John Donoghue and colleagues to develop new microelectrodes for long-term implantation, greatly increasing the number of neurons detected. The multi-electrode array led to breakthroughs, allowing quadriplegics to perform simple motor tasks such as controlling a computer, guiding a wheelchair or moving a robotic arm.

The Keck Foundation grant helped catalyze the expansion of neurology research at Brown, which now includes the Brown Institute for Brain Science, a multidisciplinary effort including more than 100 faculty members from 11 departments and created BrainGate, a Donoghue laboratory spinoff company to construct a mind-to-movement system. Early progress was featured in 2008 on 60 Minutes, and early clinical trials are now underway.

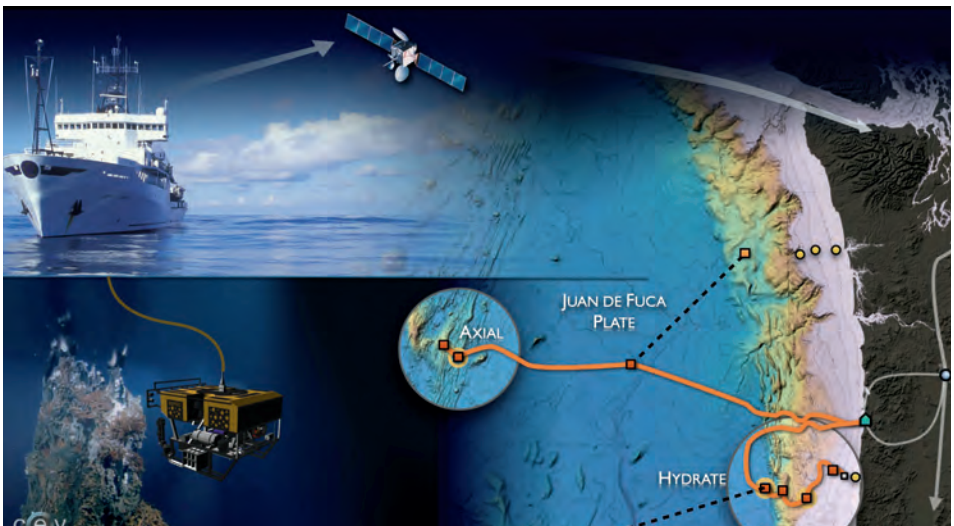


As a paralyzed person imagines moving his or her hand, the brain-computer interface records neuronal signals and interprets them to carry out the intended movement

unexpected revelation of the Keck-supported project was the discovery that blue whales tend to spend considerable time in the vicinity of tectonically active submarine volcanoes. Other scientists have noted that near-surface zooplankton descend as far as two kilometers to graze on the upper surfaces of the plumes that gather above the active vent fields. Active volcanoes can also release microbes that normally live below the seafloor into the ocean around them. These white microbial eruptions are called "snow blowers." The ability to continually monitor the Axial Seamount creates unprecedented opportunities to study such phenomena and to understand their place in the global web of life.

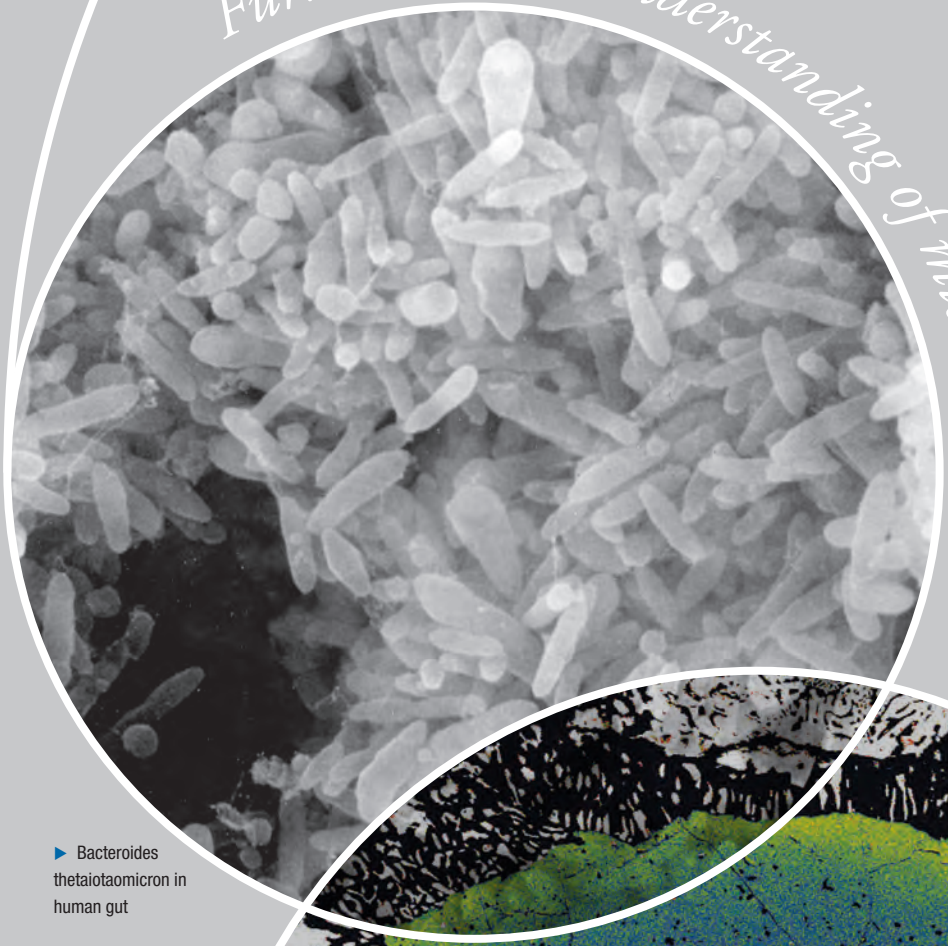
Monitoring underwater volcanoes has also revealed surprising biological phenomena linked to eruptions.

Due to the success of Project NEPTUNE, UW was designated as one of the Implementing Organizations for the Regional Scale Nodes (RSN) component of the NSF-supported Ocean Observatories Initiative (OOI; $386 million). The RSN as a whole is patterned after the initial design of Project NEPTUNE. The OOI system is designed to be expandable during its planned 25-year lifetime. The system can be augmented with additional study sites and sensor networks at other scientifically important locations. The continuous, high-quality observations made over the lifespan of the whole OOI system will provide essential data to improve predictive models of ocean processes. ■

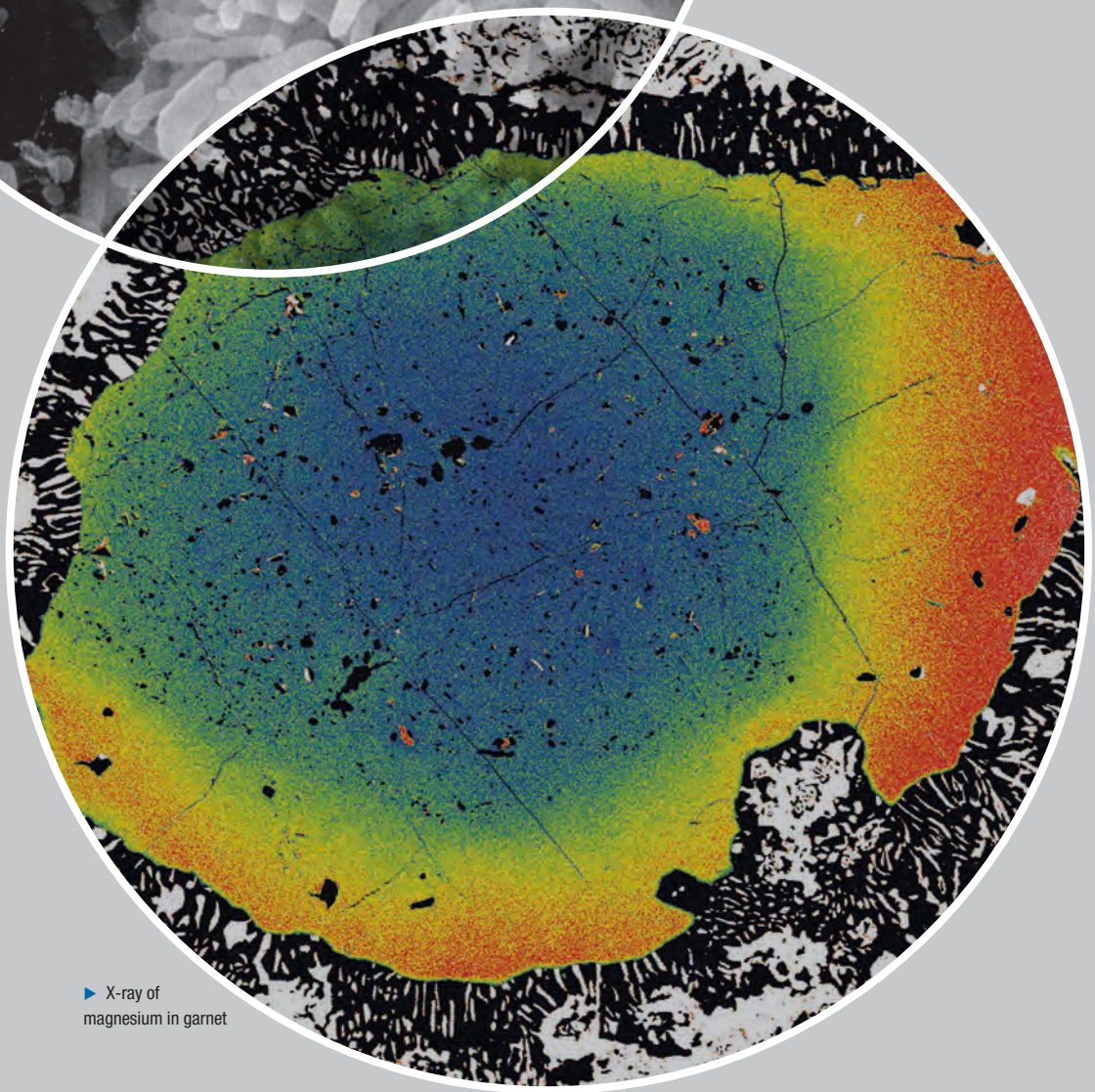


◄ Scientific instruments relay information in real time to an on-shore base, where sensors monitor from the plate margin to the deep ocean; the Axial Seamount – the plate's most active volcano is a particular focus for study. Ship-bound research vessels can also relay their data to the network in real time via satellite

Furthering our understanding of microbiomes



▶ Bacteroides thetaiotaomicron in human gut



▶ X-ray of magnesium in garnet

Opening New Fields

Humans are a composite of microbial and human cells. Our bodies harbor ten times as many microorganisms as our own cells. Hence our genetic material includes genes from our microbial passengers as well as our own genes. Similarly, our metabolic features are an amalgamation of human and microbial traits.

In 2004, the Keck Foundation made a $1.45 million grant to Washington University in St. Louis to analyze the microbes that live in our intestines, where the vast majority of human microorganisms reside.

Our ability to break down different foods depends in part on the microorganisms that live in our digestive tracts. In 2004, the W. M. Keck Foundation made a $1.45 million grant to Washington University in St. Louis to analyze the microbes that live in our intestines, where the vast majority of our microorganisms reside. Jeff Gordon and his team found a link between obesity and intestinal microbial populations. They found evidence that the gut microbial community of obese mice is more efficient at harvesting energy—it has a greater capacity to process carbohydrates into short chain fatty acids that can be readily absorbed by the host—than the gut microbial community of lean animals, thus showing that our microbiota can impact our risk of becoming obese.

As early as 2001, Jeff Gordon had sequenced the genome of a prominent member of the human gut bacterial community, *Bacteroides thetaiotaomicron.* By 2003, he and his team had expanded their effort to include characterizing the entire genetic landscape of gut microbes. At the time, they were in the unique position of being able to use genomic tools to study an area not yet well explored. Prior to the Keck Foundation's 2004 grant, the genomic characteristics of microbes residing in the human gut were largely unknown.

Utilizing gnotobiotic (germ-free) mice—animals that have had no exposure to microorganisms and therefore have sterile guts—allowed the investigators to observe the effect of introducing individual bacterial species into the animals. The team found that adult germ-free mice are leaner than their conventionally raised counterparts that have acquired a microbial community at birth. Transplantation of a gut microbial community from conventional mice to germ-free mice resulted in an increase in the number of fat cells.

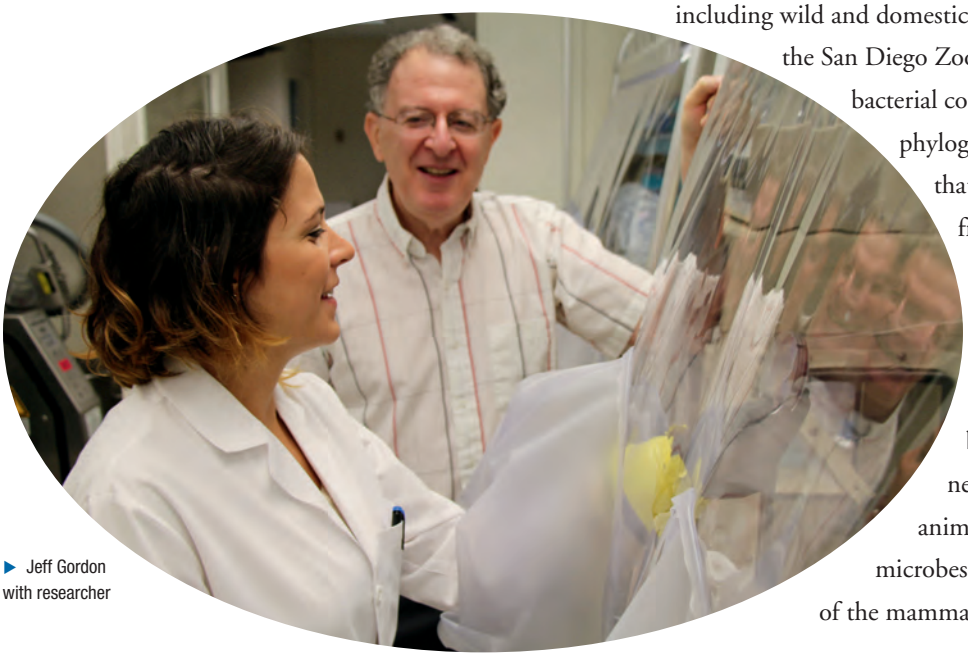
Funds from the Keck Foundation grant also helped Washington University researchers initiate a pilot study on the fecal microbial communities of children from Malawi suffering from conditions known as kwashiorkor and marasmus.

▶ Gnotobiotic mouse facility

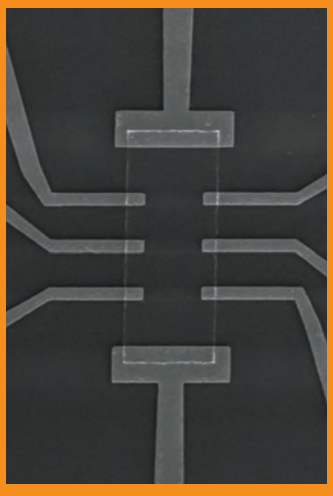
Malawi has very high rates of child malnutrition. This case study included sets of twins aged 1-3 years, genetically identical but with different types of malnutrition. One twin had marasmus, a severe energy deficit due to deficiency of all nutrients, while the other had kwashiorkor, malnutrition due to protein deficiency. The investigators characterized the microbiomes associated with kwashiorkor and marasmus. This set the stage for future efforts to determine whether microbial communities play any role in the pathogenesis of severe malnutrition and its responsiveness to treatment.

"The Keck Foundation provided a boost to science, and I hope that investment was one of the reasons that the microbiome project was captured by the road map initiative."

Keck Foundation support also helped the team conduct a study that focused on the relationships among mammalian gut microbial ecology, diet and the mammalian phylogenetic tree. The study involved collecting gut microbe samples from several mammalian species, including wild and domesticated mammals, many from the San Diego Zoo. The investigators found that bacterial communities have co-diversified phylogenetically with their hosts and that bacterial diversity increases from carnivory to omnivory to herbivory. Two branches of bacteria dominate the distal gut microbial community of mammals, the firmicutes and bacteroidetes. Such work brings new insights and perspectives to animal evolution—implicating gut microbes as co-conspirators in the success of the mammals.



▶ Jeff Gordon with researcher



Topological insulator for low-power electronics

STANFORD UNIVERSITY

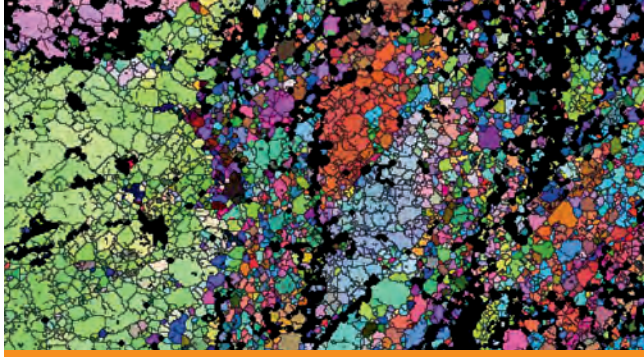
Moore's Law states that the number of transistors on a semiconductor chip will double every 18 months. However, as the size of semiconductor chips approaches the nanoscale, heat dissipation increases exponentially, disrupting the normal operation of computing devices. Solving the problem of dissipation is a grand challenge in computing. A Stanford University team led by Shoucheng Zhang, Yi Cui and David Goldhaber-Gordon investigated novel topological insulator materials where electrons move like automobiles in different lanes on a highway, avoiding backscattering and dissipation. In 2006, the group predicted the quantum spin Hall effect, a new topological state of quantum matter that allows current flow without dissipation at room temperature. Identification of mercury telluride as the first topological insulator launched a world-wide competition to find new materials with more robust properties. Zhang's group also predicted that alloys of bismuth and antimony telluride would constitute three-dimensional topological insulators. These materials can be readily fabricated and function robustly at room temperature. The group fabricated a nano-wire device with dramatically improved performance and observed the superconducting Josephson effect of topological insulators, laying the groundwork for topological quantum computing.

Justin Serugo in Gordon's laboratory

The Foundation's $1.4 million investment in this project helped transform the field of metagenomics. In the summer of 2005, the researchers submitted a white paper titled "The Human Gut Microbiome Initiative" to the National Institutes of Health's National Human Genome Research Institute. The team proposed to sequence 100 different microbes in the human gut. Their goal was to develop a set of reference genomes to help interpret subsequent metagenomic datasets. It was the first microbial genome sequencing project ever funded by that Institute. This white paper, along with data generated on the mice obesity microbiome model with Keck Foundation support, played a pivotal role in catalyzing the launch of the Human Microbiome Project, one of the National Institutes of Health's Roadmap Initiatives.

"The timing of the Keck award affected the decision making within the NIH in terms of what road map initiative should be funded. The Keck Foundation provided a boost to science, and I hope that investment was one of the reasons that the microbiome project was captured by the road map initiative." Jeff Gordon

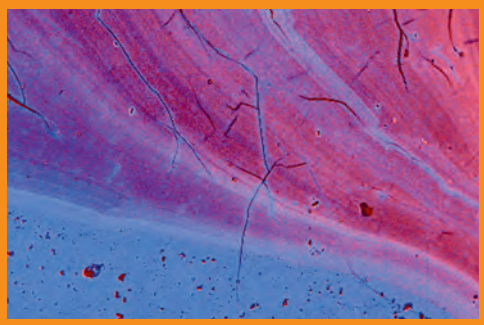
The National Institutes of Health launched the first phase of the Human Microbiome Project in 2007 to characterize the composition and diversity of the microbial communities inhabiting the major mucosal surfaces of the human body: nasal passages, oral cavities, skin, gastrointestinal tract and urogenital tract. The current phase of the Human Microbiome Project (FY 2013 – FY 2015) is focused on creating the first integrated dataset of the interactions between microbiomes and host genomes and how they contribute to disease. Given our increased knowledge of the importance of the microbiome to human health, we expect many more breakthroughs will result from the Keck Foundation's original investment. ■



Electron diffraction of olivine crystals

UNIVERSITY OF TEXAS AT AUSTIN

Microbial interactions with minerals and fluids in the earth's shallow subsurface are a poorly understood component of the Earth System. Microbial biomineralization is common in environments such as Yellowstone National Park and hot springs in Iceland. Microbes modify the Earth's geochemistry by precipitating sulfides, phosphates and carbonates, concentrating metals and nucleating crystals. In 2001, the Keck Foundation made a grant of $750,000 to the University of Texas at Austin to provide an environmental scanning electron microscope (ESEM) for microscale imaging and chemical microanalysis for geomicrobiology. At the time, microbial influence was becoming a central issue in aqueous geochemistry. A microbial cell can alter water chemistry to force mineral dissolution or coat a mineral with organic materials to shield it from biochemical reactions. ESEM was one of the few techniques available to probe this microenvironment without perturbing it. Using ESEM, investigators were able to visualize the formation of carbonate minerals such as dolomite directly from the metabolic activity of microbial communities. Before this study, it was difficult to precipitate dolomite under natural conditions, and many attempts to synthesize it in abiotic laboratory experiments had failed. Dolomite is a mineral often found in ancient sedimentary rocks. Understanding its formation illuminates specific aspects of the geochemical and microbial evolution of the Earth through time.



Climatic effects on Silica

2014

GRANTS

2014 REPRESENTATIVE GRANTS

MEDICAL RESEARCH

Baylor College of Medicine
Houston, TX
Susan Rosenberg, Kyle Miller, Christophe Herman
$2,000,000
To engineer proteins called "freeze-frame" proteins that can trap and fluorescently label mammalian DNA during replication and repair in live cells.

Emory University
Atlanta, GA
Eric Ortlund, Graeme Conn
$1,000,000
To understand the evolution of molecular interactions between proteins, RNA and DNA using resurrected ancient molecules.

Gallaudet University
Washington, DC
Laura-Ann Petitto, Melissa Malzkuhn, Arcangelo Merla, David Traum, Brian Scassellati
$900,000
To study how humans acquire language using state-of-the-art imaging technologies and to develop language learning tools.

Hereditary Disease Foundation
New York, NY
Nancy Wexler, Robert Darnell, Jean Paul Vonsattel
$1,000,000
To identify genetic modifiers that affect the age of onset of inherited diseases using a unique resource available for Huntington's disease.

Nationwide Children's Hospital
Columbus, OH
Veronica Vieland, Jayajit Das, Susan Hodge, Sang-Cheol Seok
$500,000
To develop new mathematical frameworks for data analysis of biomedical studies.

Northeastern University
Boston, MA
Nian X Sun, Matteo Rinaldi, Sydney Cash (Massachusetts General Hospital/Harvard Medical School)
$1,000,000
To create a new sensor technology for simultaneous detection of magnetic and electrical activity in the human brain.

Northern Arizona University
Flagstaff, AZ
Kiisa Nishikawa, Brent Nelson, Christopher Mann, Matthew Gage
$1,000,000
To test a new model of muscle contraction called the winding filament by combining atomic force microscopy and electron holographic tomography.

Salk Institute for Biological Studies
La Jolla, CA
Clodagh O'Shea, Mark Ellisman
$1,000,000
To develop a new methodology for visualizing the structure and function of DNA using correlated light and electron microscopy.

Stanford University
Stanford, CA
Manu Prakash, Zev Bryant
$1,000,000
To design and assemble molecular motors that actively transport cargo along scaffold-like tracks made of cytoskeletal proteins to understand fluid dynamics within the cell.

University of California, San Francisco
San Francisco, CA
Bo Huang, Noelle L'Etoile, Geeta Narlika, Lei Qi, Jonathan Weissman, Chao-Ting Wu
$1,000,000
To develop new microscopy tools that would allow live tracking of genomic elements and their epigenetic status in living cells and animals.

University of California, Santa Barbara
Santa Barbara, CA
Tod Kippin, Kevin Plaxco, Tom Soh
$1,000,000
To engineer analytical tools that could track multiple small molecules in the brain of awake and ambulatory rodents.

University of Georgia
Athens, GA
Michael Tiemeyer, Stephen Dalton, Marcus Fechheimer, Charles Schwartz, Richard Steet, Kevin Strauss, Lance Wells
$1,800,000
To identify and characterize the glycosylation changes that affect human neurodegenerative, developmental and cognitive disorders.

University of Illinois at Urbana-Champaign
Urbana, IL
Susan Martinis, Steven Blanke, Jie Chen, Lin-Feng Chen, Raven Huang, Zaida Luthey-Schulten
$1,400,000
To determine the structures and functions of genetic variants of aminoacyl tRNA synthetases (AARSs) in humans.

SCIENCE AND ENGINEERING RESEARCH

Carnegie Institution of Washington
Washington, DC
Robert Hazen
$1,400,000
To develop integrated data resources for studying the co-evolution of the Earth's geosphere and biosphere.

Oregon State University
Corvallis, OR
Jack Barth, Kelly Benoit-Bird, Geoffrey Hollinger
$1,000,000
To develop autonomous underwater vehicles capable of species-specific detection of marine organisms and smart navigation.

Purdue University
West Lafayette, IN
Ji-Xin Cheng
$1,000,000
To develop an imaging platform capable of microsecond-scale vibrational spectroscopy of live cells.

Rice University
Houston, TX
Daniel Mittleman
$1,000,000
To develop new technologies for terahertz communications and imaging.

Stanford University
Stanford, CA
Mark Kasevich
$1,000,000
To develop technologies for atom interferometry that could lead in the future to a new type of gravitational wave detector.

University of California, Irvine
Irvine, CA
Filippo Capolino
$2,000,000
To develop a scanning optical frequency magnetic nanoprobe microscope.

University of California, Los Angeles
Los Angeles, CA
Rob N. Candler
$1,000,000
To develop a table-top x-ray free electron laser.

University of Colorado, Boulder
Boulder, CO
Prashant Nagpal, Anushree Chatterjee
$1,000,000
To develop a new technology using charge tunneling to assay biochemical properties of single molecules.

University of Oklahoma
Norman, OK
Alberto Marino
$1,000,000
To increase the sensitivity of quantum-enhanced plasmonic sensors by several orders of magnitude.

University of Washington
Seattle, WA
Andrea Stocco, Chantel Prat, Rajesh Rao
$1,000,000
To advance capabilities for brain-to-brain communication in humans.

Yale University
New Haven, CT
Corey O'Hern
$1,000,000
To develop a theoretical framework for predicting the behavior of granular materials through work that blends theory, experimentation and simulation.

Yale University
New Haven, CT
Jack Harris
$1,000,000
To study the transition between quantum physics and classical physics using magnetically levitated superfluid helium drops.

UNDERGRADUATE EDUCATION

Austin College
Sherman, TX
Stephanie Gould
$250,000
To expand the incorporation of leadership skills across the sciences.

California Baptist University
Riverside, CA
Mark Anklam
$250,000
To provide a suite of equipment for a new program in chemical engineering.

California State University, Long Beach
Long Beach, CA
Young Seok Shon
$500,000
To establish an interdisciplinary undergraduate energy materials research program.

California State University System
Long Beach, CA
Judy Botelho, Ken O'Donnell, Elaine Ikeda, Rebecca Eddy, Cathy Avila-Linn
$500,000
To study the impact of service learning on achievement in science, technology, engineering and mathematics.

California State University, Sacramento
Sacramento, CA
Thomas Landerholm
$300,000
To integrate research on the American River in introductory through advanced laboratory courses in the biological sciences.

Chapman University
Orange, CA
Janeen Hill
$1,000,000
To provide chemistry equipment for a new science center.

Gonzaga University
Spokane, WA
Jeff Watson
$250,000
To develop a model for linking science courses in different departments with a single experimental system.

Mount St. Mary's College
Los Angeles, CA
Kim Middleton
$500,000
To establish an undergraduate research program that spans all academic disciplines.

Portland State University
Portland, OR
Corey Griffin
$300,000
To support an undergraduate program in building science for architecture and engineering students by establishing a Research-based Design Teaching Laboratory.

Southwestern University
Georgetown, TX
Maria Cuevas
$300,000
To equip a new molecular biology center and incorporate inquiry-based molecular research techniques across the curriculum.

University of Colorado, Boulder
Boulder, CO
Derek Briggs, Robert Talbot, Jenny Knight
$300,000
To create a model for validating Concept Inventories across all STEM disciplines, starting with genetics as a test case.

University of Portland
Portland, OR
Heather Dillon
$250,000
To develop laboratory modules based on inquiry-based learning in the mechanical engineering program.

SOUTHERN CALIFORNIA

Arts and Culture

KCRW
Santa Monica, CA
$500,000
To expand programming by equipping a broadcasting and media center.

Kidspace Museum
Pasadena, CA
$250,000
To expand and enhance programming for young children by supporting new exhibits for the Discovery Gardens.

Latino Theater Company
Los Angeles, CA
$150,000
To expand arts and cultural programming by renovating the historic Los Angeles Theatre Center in downtown.

Los Angeles County Arboretum & Botanic Garden
Arcadia, CA
$125,000
To support interpretive programs for Crescent Farm to demonstrate sustainable landscape practices.

Otis College of Art and Design
Los Angeles, CA
$100,000
To develop an online studio course focusing on foundational art and design skills for high school students and the general public.

Civic and Community

A Place Called Home
Los Angeles, CA
$200,000
To expand youth programming by creating a new teen center, gallery and performing arts space in South Los Angeles.

Antelope Valley Partners for Health
Lancaster, CA
$175,000
To expand wellness programs and equip a new Family Resource and Training Center.

Ascencia
Glendale, CA
$250,000
To expand services to homeless individuals and families by renovating a new Access Center.

Boys & Girls Club of the Foothills
Monrovia, CA
$150,000
To provide positive youth development experiences for at-risk youth at a new Teen Center.

Community Coalition
Los Angeles, CA
$400,000
To renovate a building in South Los Angeles for training community leaders.

Foothill Family Service
Pasadena, CA
$250,000
To expand services by renovating the Duarte Family Center.

New Horizons: Serving Individuals with Special Needs
North Hills, CA
$150,000
To establish a model program to care for developmentally disabled adults with dementia by constructing a residential home.

Rainbow Services
San Pedro, CA
$140,000
To expand services to victims of domestic violence and their children by renovating the existing community resource center.

United Way of Greater Los Angeles
Los Angeles, CA
$350,000
To create a county-wide coordinated entry system to link homeless youth, families and adults to appropriate housing and services.

Volunteers of America
Los Angeles, CA
$150,000
To assist traumatized female military veterans and their children by providing affordable housing and supportive services.

Health Care

Achievable Foundation
Culver City, CA
$150,000
To improve health outcomes for children and adults with developmental disabilities by supporting a new clinic.

Family Health Care Centers of Greater Los Angeles
Bell Gardens, CA
$300,000
To expand primary health care services by renovating a community clinic in Bell Gardens.

Northeast Valley Health Corporation
San Fernando, CA
$300,000
To increase access to pediatric dental care at two clinic sites.

Phoenix Houses of California, Inc.
Lake View Terrace, CA
$250,000
To create an integrated health care service model for high-risk adults suffering from co-occurring mental health and substance abuse disorders.

Valley Community Clinic
North Hollywood, CA
$250,000
To increase access to health care for students and the community by supporting a new school-based health center at Monroe High School in the San Fernando Valley.

Venice Family Clinic
Venice, CA
$300,000
To expand access to health care and preventive programs by establishing a Family Wellness Complex in Mar Vista.

Precollegiate Education

Bright Prospect
Pomona, CA
$200,000
To expand a college access and completion program serving five high schools in the greater Pomona area.

Building Excellent Schools
Boston, MA
$250,000
To establish new high-performing charter schools in Los Angeles by opening a West Coast office and training a new cohort of fellows to develop the schools.

California Community Colleges System
Sacramento, CA
$350,000
To support implementation of the California College Guidance Initiative in Southern California to improve college preparation and admission for low-income students.

California State University System
Long Beach, CA
$200,000
To pilot a university-community collaborative project to enhance STEM teaching and learning.

Catalina Island Conservancy
Long Beach, CA
$200,000
To fully develop NatureWorks, a K-12 school- and field-based STEM curriculum linked to career pathways.

Inner City Education Foundation
Los Angeles, CA
$250,000
To provide a permanent facility for View Park Preparatory Accelerated Charter Elementary and Middle Schools.

KIPP LA Schools
Los Angeles, CA
$175,000
To provide a permanent facility for the KIPP Empower Academy serving elementary school students in South Los Angeles.

Loyola Marymount University
Los Angeles, CA
$200,000
To redesign the elementary teacher preparation program focusing on STEM education in collaboration with a Los Angeles Unified School District demonstration school.

2014

FINANCIAL STATEMENTS

REPORT OF INDEPENDENT AUDITORS

The Board of Directors of
the W. M. Keck Foundation

We have audited the accompanying financial statements of the W. M. Keck Foundation, which comprise the statements of financial position as of December 31, 2014 and 2013, and the related statements of activities, and cash flows for the years then ended, and the related notes to the financial statements.

MANAGEMENT'S RESPONSIBILITY FOR THE FINANCIAL STATEMENTS

Management is responsible for the preparation and fair presentation of these financial statements in conformity with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free of material misstatement, whether due to fraud or error.

AUDITOR'S RESPONSIBILITY

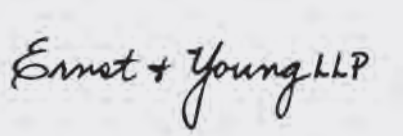
Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

OPINION

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the W. M. Keck Foundation as of December 31, 2014 and 2013, and the results of its activities and its cash flows for the years then ended in conformity with U.S. generally accepted accounting principles.



May 14, 2015

STATEMENTS OF FINANCIAL POSITION

December 31 (in thousands)	2014	2013
ASSETS		
Cash and cash equivalents	$ 17,490	$ 34,027
Receivable from brokers	193	1,161
Interest and dividends receivable	866	1,246
Prepaid federal excise taxes	678	783
Investments	1,214,822	1,214,866
Other assets	363	2,457
Total assets	$ 1,234,432	$ 1,254,540
LIABILITIES AND NET ASSETS		
Payable to brokers	$ 169	$ 959
Accounts payable and accrued expenses	1,869	2,002
Grants payable, net (*Note 5*)	12,394	16,822
Deferred federal excise taxes payable	5,545	5,995
Total liabilities	19,977	25,778
Unrestricted net assets	1,214,455	1,228,762
Total liabilities and unrestricted net assets	$ 1,234,432	$ 1,254,540

See accompanying notes.

STATEMENTS OF ACTIVITIES

Year Ended December 31 (in thousands)	2014	2013
REVENUE		
Interest	$ 7,793	$ 6,387
Dividends	8,477	7,156
Other income	169	120
	16,439	13,663
Realized and unrealized gains and losses on investments:		
Net realized gains	57,404	33,238
Change in net unrealized gains	(22,429)	168,975
	$ 34,975	$ 202,213
Total revenues and net realized and unrealized gains on investments	51,414	215,876
EXPENSES		
Grants	$ 55,214	$ 54,992
Management and general services	5,770	5,985
Investment management fees	4,340	4,080
Federal excise tax provision	356	3,800
Tax withheld	41	142
Total expenses	$ 65,721	$ 68,999
Change in unrestricted net assets	(14,307)	146,811
Unrestricted net assets, beginning of year	1,228,762	1,081,885
Unrestricted net assets, end of year	$ 1,214,455	$ 1,228,762

See accompanying notes.

STATEMENTS OF CASH FLOWS

Year Ended December 31 (in thousands)	2014	2013
OPERATING ACTIVITIES		
Change in unrestricted net assets	$ 146,877	$ 146,877
Adjustments to reconcile change in unrestricted net assets to net cash used in operating activities:		
Depreciation and amortization	50	95
Net realized gains on investments	(57,404)	(33,238)
Change in net unrealized gain on investments	22,395	(169,205)
Changes in operating assets and liabilities:		
Receivable from brokers	968	691
Interest and dividends receivable	360	660
Other assets	2,076	(427)
Prepaid federal excise taxes	106	(828)
Payable to brokers	(790)	(2,882)
Accounts payable and accrued expenses	(97)	72
Deferred federal excise taxes payable	(450)	3,379
Grants payable	(4,428)	1,346
Net cash used in operating activities	(51,521)	(53,400)
INVESTING ACTIVITIES		
Purchases of investments	(326,977)	(370,964)
Proceeds on disposition of investments and return of capital	362,029	404,186
Acquisition of fixed assets	(68)	(4)
Net cash provided by investing activities	34,984	33,218
Net (decrease) increase in cash and cash equivalents	(16,537)	(20,182)
Cash and cash equivalents, beginning of year	34,027	54,209
Cash and cash equivalents, end of year	$ 17,490	$ 34,027
SUPPLEMENTAL DISCLOSURE		
Taxes paid during the year	$ 700	$ 1,250

See accompanying notes.

1. ORGANIZATION

Formation and Goals of the Foundation

W. M. Keck established the W. M. Keck Foundation (the Foundation) as a charitable trust in 1954. In 1959, Mr. Keck changed the trust entity to a corporate entity by forming the W. M. Keck Foundation as a Delaware corporation and by transferring the trust's assets, and eventually by bequeathing the residue of his estate, to the corporation. It is this Delaware corporation which exists today and continues to be known as the W. M. Keck Foundation. The Foundation's goals are principally to identify and support university and college research and education programs in the areas of science, engineering and medicine. In addition, the Foundation gives some consideration to promoting liberal arts education and, in Southern California only, to supporting community services, health care, precollegiate education, and the arts. Operations are funded by the Foundation's returns on its investment portfolio.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Grant Payments Made

In accordance with accounting standards for not-for-profit entities, unconditional grant payments are recognized as an expense in the period in which they are approved. If these grants are to be paid over a period exceeding one year, they are recorded at the net present value of the future cash payments, using an applicable Treasury Bill rate. Grants that are conditioned upon a future and uncertain event are expensed when these conditions are met or expected to be met in the subsequent year. A conditional promise to give is considered unconditional if the possibility that the condition will not be met is remote.

Cash and Cash Equivalents

Cash and cash equivalents are defined as liquid investments with remaining maturities of three months or less at time of purchase.

Investments

Investments in equity securities with readily determinable fair values and all investments in debt securities are measured at fair value in the statements of financial position. Fair value is established based on quoted prices from recognized securities exchanges.

Investments in private equity funds, commingled funds, and hedge funds are measured at fair value, using the net asset value as a practical expedient, which is based on net asset values reported by the fund managers. Pursuant to provisions of Accounting Standards Update (ASU) 2009-12, *Investments in Certain Entities that Calculate Net Assets Value per share (or its Equivalent)*, the Foundation believes that the net asset value of these investments as of December 2014 and 2013, approximates their fair value as of that date. However, because of the inherent uncertainty of valuation, the estimated fair values for the aforementioned securities and interests may differ from the values that would have been used had a ready market for the investments existed, and the differences could be material.

Purchases and sales of securities are recorded on the trade date. Dividend income is recorded based upon the ex-dividend date. Interest income is recorded as earned on an accrual basis. Realized gains and losses are recorded upon disposition of securities based on the specific identification method. Unrealized gains and losses are included in the statements of activities and represent the net change in fair value for investments held at the end of the year.

Fair Value of Financial Instruments

The Foundation's statements of financial position include but are not limited to the following financial instruments: cash and cash equivalents, accounts payable, and accrued liabilities. The Foundation considers the carrying amounts of these assets and liabilities in the statements of financial position to approximate the fair value of these financial instruments because of the relatively short period of time between origination of the instruments and their expected realization.

Concentrations of Credit Risk

Financial instruments that potentially subject the Foundation to concentrations of credit risk consist of cash and cash equivalents and investments. The investment portfolio is managed within the investment guidelines established by the Board of Directors.

Fixed Assets

Fixed assets are carried at cost, less accumulated depreciation, and are included in other assets in the statements of financial position. Depreciation is computed on the straight-line method over the estimated useful life of each type of asset or the term of the related lease, whichever is shorter. The depreciable lives for leasehold improvements are ten years and for furniture and equipment are five years.

Fair Value Measurement

The Foundation applies the principles of the accounting standard Accounting Standards Codification (ASC) 820, *Fair Value Measurements*, for all financial assets and liabilities that are recognized or disclosed at fair value in the financial statements. This standard defines fair value, establishes a consistent framework for measuring fair value, and expands disclosure for each major asset and liability category measured at fair value on either a recurring or nonrecurring basis. The standard clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. As a basis for considering such assumptions, the Foundation establishes a three-level fair value hierarchy, which prioritizes the inputs used in measuring fair value as follows:

Level 1 – Assets that have readily observable prices (quoted prices in active markets accessible at the measurement date for assets). The fair value hierarchy gives the highest priority to Level 1 inputs.

Level 2 – Assets that are based on quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and modelbased valuation techniques for which all significant assumptions are observable in the market or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Financial assets and liabilities in this category generally include asset-backed securities, corporate bonds and loans, municipal bonds, forward contracts, future contracts, interest and credit swap agreements, options, and interest rate swaps.

Level 3 – Assets whose fair value cannot be determined by using observable measures, and can only be calculated using estimates or risk-adjusted value ranges, when little or no market data is available. The inputs into the determination of fair value require management's judgment or estimation of assumptions that market participants would use in pricing the assets or liabilities. The fair values are therefore determined using factors that involve considerable judgment and interpretations, including, but not limited to, private and public comparables, third-party appraisals, discounted cash flow models, and fund manager estimates. The fair value hierarchy gives lowest priority to Level 3 inputs.

Assets and liabilities measured at fair value are based on one or more of three valuation techniques noted in the tables below:

(a) *Market approach.* Prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities.

(b) *Cost approach.* Amount that would be required to replace the service capacity of an asset (replacement cost).

(c) *Income approach.* Techniques to convert future amounts to a single present amount based on market expectations (including present value techniques, option-pricing and excess earnings models).

The Foundation's assets measured at fair value on a recurring basis at December 31, 2014, were as follows (in thousands):

	December 31, 2014		
	Level 1	Level 2	Level 3
Assets:			
Common and Preferred Stock	$ 408,284	$ –	$ –
Corporate Bonds	–	17,862	–
Municipal Bonds	–	3,014	–
Government Bonds	8,909	264	–
Foreign Investments	8,368	6,797	–
Mortgage and Asset-backed Securities	–	27,003	–
Mutual Funds	360,795	–	–
Private Equity Funds	–	–	99,080
Commingled Funds	–	77,144	–
Hedge Funds	–	197,302	–
Total	$ 786,356	$ 329,386	$99,080

The Foundation's assets measured at fair value on a recurring basis at December 31, 2013, were as follows (in thousands):

	December 31, 2013		
	Level 1	Level 2	Level 3
Assets:			
Common and Preferred Stock	$ 362,365	$ –	$ –
Corporate Bonds	–	18,850	–
Municipal Bonds	–	3,799	–
Government Bonds	5,452	580	–
Foreign Investments	9,937	6,904	–
Mortgage and Asset-backed Securities	–	25,517	–
Mutual Funds	327,228	–	–
Private Equity Funds	–	–	98,882
Commingled Funds	–	143,548	–
Hedge Funds	–	211,804	–
Total	$ 704,982	$ 411,002	$ 98,882

The Foundation has classified its mutual funds, equity securities, preferred stock, and certain of its government bonds and foreign investments which have quoted prices in active markets as Level 1 within the fair value hierarchy. These securities are valued under the market approach using inputs observable in active markets for identical securities. The Foundation has classified certain of its government bonds, corporate bonds, municipal bonds, foreign bonds, mortgage and asset-backed securities, bank loans, commingled funds and hedge funds as Level 2 investments. The fair value of these assets is valued under the market approach using inputs observable in active markets for similar assets. The Foundation has classified its private equity funds as Level 3 investments and measured these private equities at fair value, using the net asset value as a practical expedient, which is based on net asset values reported by the fund managers. The fair value of the underlying assets in private equity funds are valued under the income approach using discounted cash flows and other inputs not observable in active markets.

The table below sets forth a summary of changes in fair value of the Level 3 assets for the years ended December 31, 2014 and 2013 (in thousands):

Year Ended December 31	2014	2013
Balance – beginning of year	$ 98,882	$ 85,210
Additions	$ 14,876	$ 19,228
Distributions	$ (14,965)	$ (26,620)
Change in fair value	$ 287	$ 21,064
Balance – end of year	$ 99,080	$ 98,882

The cumulative unrealized gains in Level 3 assets held at December 31, 2014 and 2013 (as reported in the summary of changes in fair values above) were $2,525,000 and $2,238,000 respectively.

3. INVESTMENTS

The cost and fair value of investments are as follows (in thousands):

	December 31, 2014		December 31, 2013	
	Cost	Fair Value	Cost	Fair Value
Common and Preferred Stock	$ 270,367	$ 408,284	$ 224,782	$ 362,3651
Corporate Bonds	16,008	17,862	17,215	18,850
Municipal Bonds	2,391	3,014	3,269	3,799
Government Bonds	9,132	9,173	5,998	6,032
Foreign Investments	15,018	15,165	14,836	16,841
Mortgage and Asset-Backed Securities	26,469	27,003	25,031	25,517
Bank Loans	–	–	–	–
Mutual Funds	355,087	360,795	310,253	327,228
Private Equity Funds	96,449	99,080	96,538	98,882
Commingled Funds	55,412	77,144	111,026	143,548
Hedge Funds	91,182	197,302	106,182	211,804
	$ 937,515	$ 1,214,822	$ 915,130	$ 1,214,866

The change in net unrealized gains (losses) on investments is reflected in the statements of activities and is summarized as follows (in thousands):

Year Ended December 31	2014	2013
Net unrealized gains, beginning of year	$ 299,736	$ 130,761
Add net unrealized gains (losses) on investments for the year	$ (22,429)	$ 168,975
Net unrealized gains, end of year	$ 277,307	$ 299,736

The Foundation has made total capital contributions (net of distributions/return of capital) of $243,149,000 to seven private equity funds, two commingled funds and two hedge funds it holds as of December 31, 2014. The commingled funds can be redeemed on a monthly basis and are primarily invested in Level 1 equity securities in the international and emerging markets. The hedge funds can be redeemed on an annual basis and are primarily invested in Level 1 equity securities (U.S. and international) and some corporate bonds and various other Level 2 investments. The private equity funds are primarily invested in life sciences, biotechnology, energy, financial services, media, healthcare and industrial companies, as well as buyouts and family-owned and entrepreneurial business. These funds are valued using Level 3 inputs and are subject to lock up provisions ranging from 0 to 14 years subject to certain further extension adjustments. The Foundation has a total future capital commitment related to seven private equity funds of $128,407,000 as of December 31, 2014.

4. TAXES

The Foundation qualifies as a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code and, accordingly, is not subject to federal income taxes. However, the Foundation is classified under the Internal Revenue Code (IRC) as a private foundation and, as such, is subject to a federal excise tax.

During 2014, the Foundation accrued a 1% excise tax on net investment income. Private foundations are required to distribute annually, in qualifying charitable distributions, an amount equal to approximately 5% of the average fair market value of the Foundation's assets (the minimum distribution). If the Foundation does not distribute the required minimum distribution, a one-year grace period is granted to distribute the undistributed income. Under IRC §4942(a), if undistributed income is not distributed by the close of the following year, a minimum penalty of 30% of such undistributed income will apply. The Foundation's annual distributions were in excess of the required minimum for 2014 and 2013, to avoid the 30% penalty. Although the Foundation does have cumulative undistributed income at December 31, 2014, based on the Foundation's distribution history, the Foundation will be able to and intends to distribute the cumulative undistributed income from December 31, 2014, in 2015. Accordingly, the Foundation has not accrued a liability for the penalty on undistributed income.

The Foundation uses the liability method for accounting for excise taxes. The federal excise tax provision (benefit) consists of the following (in thousands):

Year Ended December 31	2014	2013
Current	$ 806	$ 421
Deferred	$ (450)	$ 3,379
	$ 356	$ 3,800

Deferred federal excise taxes have been recorded at a tax rate of 2% of the unrealized appreciation in the fair value of investments in 2014 and 2013.

The Foundation completed an analysis of its tax positions, in accordance with Financial Accounting Standards Board (FASB) ASC 740, *Income Taxes*, and determined that there are no uncertain tax positions taken or expected to be taken. The Foundation has recognized no interest or penalties related to uncertain tax positions. The Foundation is subject to routine audits by the taxing jurisdictions; however, there are currently no audits in progress for any tax periods (tax years 2011 through 2014, remain open and subject to selection for such routine audits).

5. GRANTS PAYABLE AND CONDITIONAL GRANT COMMITMENTS

Grants payable and conditional grant commitments as of December 31, 2014, are as follows (in thousands):

	Unconditional	Conditional
2015	$ 12,394	$ –
2016–2019	–	32,437
2020 and thereafter	–	90,000
	12,394	$ 122,437

Projected timetable and payment amounts shown above for conditional grants are estimated. Conditional grants will be recorded as an expense in the period when the conditions to the grant are met. These grants are conditioned upon other donors matching the amounts contributed by the Foundation, receipt of building permits and other regulations, and compliance with budget, timetable, and grant agreements' requirements.

Conditional grants outstanding as of December 31, 2014, consist of the following (in thousands):

Grantee	Date of Original Commitment	Original Commitment	Amount Outstanding*
National Academy of Sciences	2002	$ 40,345	$ 1,937
University of Southern California	2011	150,000	120,000
Other	2014	1,000	500
		$ 190,845	$ 122,437

** Only reflects the portion of the grant that remains conditional.*

6. LEASE COMMITMENTS

The Foundation leases its main office space. Annual base rent is $544,000, which is payable through November 30, 2019, the end of the lease term. Rent expense is recognized on a straight-line basis over the lease term. As of December 31, 2014, the approximate future minimum scheduled lease obligation for the lease is as follows (in thousands):

Year Ended December 31	
2015	$ 544
2016	544
2017	544
2018	544
2019	498
	$ 2,674

Total straight-line rental expense for each of the years ended December 31, 2014 and 2013, was approximately $413,500 and $413,500, respectively. Deferred rent was approximately $640,000 and $670,000 at December 31, 2014 and 2013, respectively.

7. EMPLOYEE RETIREMENT PLAN

The Foundation maintains a qualified 401(k) Profit Sharing Plan (the Plan) for eligible employees. Employees can contribute a percentage of their pretax compensation subject to IRS limitations. The Foundation matches 200% of the employee's deferral, but not more than 6% of the employee's compensation in total. The Foundation's matching contributions to the Plan were approximately $242,000 and $252,000 for the years ended December 31, 2014 and 2013, respectively.

8. RELATED-PARTY TRANSACTIONS

A director of the Foundation is a partner of a law firm that provided legal services to the Foundation. The Foundation incurred legal fees for services provided by the law firm totaling $219,000 and $239,000 for the years ended December 31, 2014 and 2013, respectively.

9. SUBSEQUENT EVENTS

The Foundation's management has evaluated subsequent events through May 14, 2015, which is the date these financial statements were available to be issued. Management has determined that no material subsequent events have occurred during that period that would require the Foundation to either recognize the financial impact of such events in the accompanying financial statements or disclose any such events to ensure the financial statements are not misleading.

ACKNOWLEDGEMENTS

Decade 1

California Science Center
Children's Bureau of Southern California
Children's Hospital Los Angeles
Venice Family Clinic

Decade 2

Jim Hanson | California Polytechnic University, San Luis Obispo
Steven Moore and Diana Sinton | University of Redlands

Decade 3

Nancy Wexler | Hereditary Disease Foundation

Decade 4

Harold A. McAlister | Mount Wilson Observatory
Andrea Ghez | UCLA

Decade 5

Greg Asner | Carnegie Institution for Science
John Delaney | University of Washington, Project NEPTUNE

Decade 6

David Goldhaber-Gordon | Stanford University
William D. Carlson | University of Texas at Austin
Jeff Gordon | Washington University in St. Louis

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Our sincere thanks and appreciation to those who graciously gave their time to help tell these stories and who allowed their work and images to be used.

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Design: THE JEFFERIES ASSOCIATION